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THE FOCAL SPOT

CANADIAN SOCIETY OF RADIOLOGICAL TECHNICIANS
SCIENTIA ET MORES

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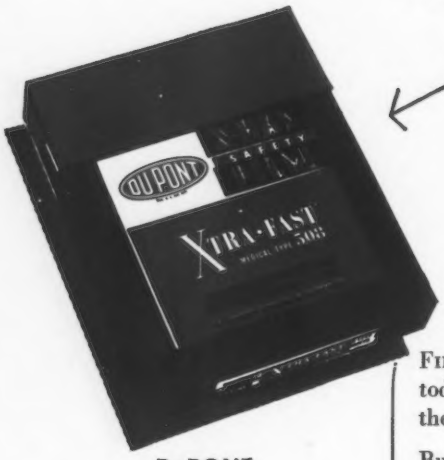

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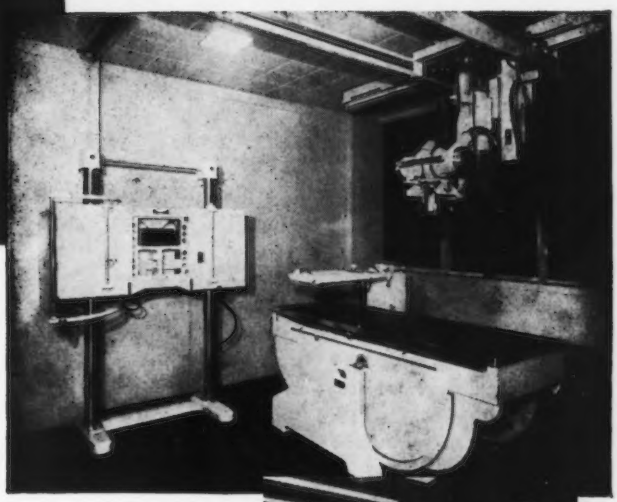

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News Items from the Provinces

ALBERTA DIVISION
C.S.R.T.

CALGARY SECTION

The Calgary Section of the Alberta Division, C.S.R.T., elected the following for office in 1954:

President: Miss A. MacNeil.

Vice-President: Mr. S. Kathrens.

Secretary-Treasurer: Mrs. Grassi, X-Ray Department, Calgary General Hospital, Calgary.

Programme Chairman—Mr. H. Becktold.

Sub-Editor, *The Focal Spot*—Miss Wanda McNamee, Radium and X-Ray Clinic, Medical Arts Bldg., Calgary.

Plans are under way for the Alberta Provincial Convention to be held in Calgary, May 1st, 1954. Let this date be kept in mind especially by the x-ray technicians outside Edmonton and Calgary as we hope to see the attendance considerably increased this year.

Miss Hendry, a charter member of the Calgary Section, is leaving active work the end of December. She plans on a travelling vacation and we wish her a safe and pleasant journey.

Since the last edition of *The Focal Spot* many new faces have been seen at our local meetings.

Miss Barbara Charman of Moncton, N.B., has taken a position at the Associate Clinic in Calgary.

Miss Ruth Eggleston from Ottawa is on the staff at the Calgary General Hospital.

Miss Woods, also from Ottawa, is at Dr. Symington's office in Calgary.

Miss Marjorie Joyce from the Winnipeg General Hospital is now with the Calgary General Hospital.

Miss Peggy Brown of Lethbridge is a student at the Col. Belcher Hospital.

Continued on page 4

EDMONTON SECTION

On September 8th the Radiological Technicians of the Edmonton Branch held their monthly meeting at the Misericordia Hospital. The new executive for 1953-'54 conducted the meeting—President Mr. G. Hall, Sec.-Treas. Shirley Fitzpatrick.

Guests welcomed by the President were Dr. Marlborough, Dr. Hurly and Dr. Hyndman.

Dr. M. Mallett, the educational advisor, gave an outstanding talk on Ethics for Radiological Technicians. Joan Graham reported on the Education Committee. The students were happy to be informed that all lectures will be held in the afternoons instead of evenings.

A very interesting summary on the International Convention was given by Ray Hendra.

It was also decided that profits from one social function this year would go to the aid of Mike Hawkes, a polio patient in a Calgary Hospital.

All the radiologists and x-ray service men were also present at this meeting.

A vote of thanks was moved to the Past President, who, along with three other members, plunged into the sea of matrimony—our sincere felicitations to the new couples.

The films on the cervical and lumbar spines which were shown at the International Convention were shown at the University Hospital on Sept. 28th.

At another monthly meeting held on Oct. 5th Dr. G. R. Wilson furthered our knowledge by a very interesting talk on "Polio" with discussion followed by the technicians.

Continued on page 4

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GENERAL ELECTRIC

NEWS ITEMS FROM THE PROVINCES

Calgary—from page 2

Miss Loretta Pesko of Galt Hospital, Lethbridge, is at the Holy Cross Hospital in Calgary preparing to write her R.T. exams.

Miss Betty Peterson has taken a position as x-ray technician at the Brooks Municipal Hospital.

Miss Joan Hayton of the Radium and X-Ray Department in the Medical Arts Building has joined the matrimonial ranks. Congratulations, Joan.

The December meeting was held at the home of Mrs. Yerex and after a short business meeting the evening was spent in singing Christmas carols after which our hostess served a very delicious lunch. Many thanks for a delightful time, Mrs. Yerex.

Wishing all a Happy New Year.

—MARGARET ALEXANDER, R.T.,
Sub-Editor.

Edmonton—from page 2

We are indebted to Gordon Barry, a Kodak representative, for his generosity in making the film "The Inside Story" (production of x-ray films) available at our last regular monthly meeting on Nov. 7th.

On Nov. 21st the E.S.R.T. gathered at the MacDonald Hotel in honor of the graduating technicians.

The evening began with a banquet with more than 150 present. Mr. George Hall was Chairman for the evening.

Our guest speaker Mr. Dr. E. O. Hahn, Professor of the University of Alberta, who held the interest of all with a talk on "Summer in the Arctic."

Frank Calloway proposed a toast to the Radiologists which was answered by Dr. M. Mallett.

Sue Starko gave the valedictory—on behalf of the graduates she expressed thanks for all the supervisory direction and tolerance shown them.

After the banquet cocktails were provided by the generosity of the Edmonton Radiologists and X-Ray Servicemen for which we were most grateful. The dance followed; a gay time was had by all.

—ADELLE PHILLIPS, R.T.,
Sub-Editor.

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Both branches of the Division have been quite busy during the last two months of the old year. The Victoria Branch had many happy events. Just before Christmas the staff of St. Joseph's Hospital had a gay time at the Chalet Matterhorn which was preceded by a cocktail party at the home of Dr. Tchaperoff. A grand time was had by all members who attended.

The December meeting was the election meeting and we find the following officers in charge of affairs of the Victoria Branch for 1954.

President—Mr. Len Ludwig.
Vice-President—Miss L. Mobley.
Secretary—Mr. Ray Munday.
Treasurer—Mr. J. Clarke.
Student Repres.—Mr. Eric Crump.
Branch Repres.—Mr. Derrald Thompson.

All committee chairmen have been appointed and the Branch is looking forward to a happy and productive year.

The Vancouver Branch has also been busy and two events were held in December to culminate a very good year. On December 3rd our meeting was held at the Quadra Club and on this occasion we honored our successful candidates for 1953. Each was presented with a Gift Certificate which will enable them to obtain Lapel Pins. The election of officers for 1954 was also completed at this meeting and for the Vancouver Branch we find the following occupying th various posts:

President—Miss Pat Rogers.
Vice-President—Miss Marjorie Mcbean.
Secretary—Mrs. E. Gallichan.
Treasurer—Mrs. E. I. Hood.
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B C. - continued from page 4

A hearty vote of thanks was extended to Miss Mary Harrison and her officers for the job they had done during 1953. The rest of the evening was spent in a happy and congenial way.

On December 10th our Annual Dance was held at Baker's Winter Gardens and on this occasion about fifty members attended. With their escorts the number was about one hundred. Miss Simoneau was in charge of arrangements for both the above affairs and is to be congratulated for making two very successful evenings for us.

We offer our sincere good wishes to the following students who successfully passed their examinations in November and hope they will all have a successful future as R.T.'s.

Miss Shirley Lust, Miss Jean Armitage, Miss M. Stushnoff, Miss June Newton, Mr. H. Ward, Miss B. Houston, Miss Amy Gee, Mr. H. Bromley, Miss Mary Jessop, Miss Margot Hope, Miss Marg. Findlater, Miss Joan Hodge, Mrs. E. Gallichan, Miss Eleanor Robbins, Miss Mary Love, Miss I. Staks, Miss E. Blake.

Meetings of the two branches will be covered in our own local bulletin Grid Lines. However, two important events will be coming up which need a little publicity. First, the Annual Meeting of the B.C. Division will be held in Vancouver at the T.B. Auditorium on Saturday, March 6th. We would like to have a bumper attendance at this annual affair and a very excellent programme is being arranged by the committee in charge and the day will wind up in a Dinner and Dance at the Capilano Gardens.

Another event which some of our members may wish to attend is the Annual Meeting of the Washington State X-Ray Society. This will be held in Seattle on April 3rd and a cordial invitation is extended to all Canadians from Miss Dawson who is in charge of meeting.

Meetings of the above nature give us an opportunity to meet many other technicians and form new friendships and are a source of great pleasure in every way. Details will appear in Grid Lines.

A raffle held by the Vancouver Branch under the chairmanship of Mr. Stirling netted approximately sixty dollars to our funds.

By the time this issue of *The Focal Spot* reaches our members we will be well into the new year and perhaps it is appropriate at this time to extend to all our new officers our best wishes for a happy time in office. We hereby resolve that we attend all meetings possible to make our officers happy.

—W. Q. STIRLING, R.T.,
Sub-Editor.

Another happy event modestly not chronicled in the above is that Mr. W. Q. Stirling has been honored by the receipt of the Coronation Medal. We know that all members of the C.S.R.T. will feel that this award is richly deserved and will join in extending congratulations to him.—Ed.

MANITOBA DIVISION
C.S.R.T.

The annual meeting of the C.S.R.T., Manitoba Division, was held on Nov. 24th at the St. Boniface Hospital with about 40 members present. The nominating committee, composed of Mrs. C. Coulson, Mr. C. Bodle, and Miss M. Steski submitted the following members for office: President, Mr. Phil Beaupre, St. Boniface General Hospital; Vice-President, Mr. Hugh Gibson, Brandon Sanatorium; Secretary-Treasurer, Miss Virginia Aukland, Children's Hospital, Winnipeg; Recording Secretary, Mr. Ed. Bailey, Winnipeg General Hospital. The aforementioned were unanimously elected by the members who were present to act as the executive during the year of 1954.

There was some discussion regarding the practice of holding the Annual Graduation and Dance without including formal exercises for the graduates. The regrettable absence of many graduates who have accepted positions in far off

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NOVA SCOTIA DIVISION
C.S.R.T.

HALIFAX SECTION

The Halifax Society of X-Ray Technicians has held two meetings since our last report. The November meeting was held at Camp Hill Hospital, with our local Chairman, Mr. Zwicker, presiding. At the previous meeting a motion had been passed to send a letter to all teaching hospitals in the province, explaining very clearly the requisites for student x-ray technicians to qualify for the C.S.R.T. Examinations. At the present meeting this was further discussed and the letter drafted in such a way that an answer is required. So the new Secretary-Treasurer, Mr. McLean, will have these answers shortly, it is hoped. Following the business session, Dr. Wallace M. Roy, radiologist at Victoria General Hospital, showed colored slides of his recent trip to England, Scotland, Denmark and other European countries. These were very beautful and interesting. We hope he will come again and give us the scientific part of the story of the 1953 Congress of Radiology.

The December meeting was held at the Victoria General Hospital. In the absence of the chairman, Mr. Hammond was elected acting-chairman and presided at the meeting. The technical programme consisted of a series of short papers on radiographic problems by the Victoria General technicians:

"The Hip" by Charlotte Hull, R.T.

"Mastoids" by Barbara Morton, R.T.

"Cervical Spine" by Phyllis Mollins, R.T.

"The Darkroom" by the student technicians, represented by Miss Jo Spicer.

A short discussion on "Tomography in Special Cases" was given by Dr. W. M. Roy and Mr. Eric Hammond, M.S.R., also of Victoria General. This was followed by the highlight of the evening—a group of technicians appropriately costumed, singing their own composition of "Barium Woes." The meeting was adjourned and lunch was served.

A Committee, elected to study the proposed Insurance Plan, will meet during the Christmas week; more news next edition.

A Happy New Year to all!

—JEAN UNDERWOOD, R.T.,
Sub-Editor.

Cape Breton on page 9

Manitoba - continued from page 6

fields prior to February also presents a problem which rates consideration. A committee, headed by Mr. Des. Butler, was appointed to give these matters careful thought and present recommendations at the January meeting in order to rectify the present situation.

At the termination of the business meeting, Mr. Wm. Doern showed a film of the removal of a cataract from an eye, and an assortment of other clinical illustrations. They were most interesting and educational pictures, and were greatly appreciated by all. Although our experiences in the operating room may be very limited, through the medium of motion pictures we are able to gain a great deal of knowledge vicariously. Thus we obtain a wider perspective and a greater understanding of the work of our associates which is definitely beneficial.

The Graduation Banquet and Dance will be held in the Blue Room of the St. Charles Hotel on Saturday evening, February 20th. It promises to be a most enjoyable event for everyone in attendance whether your taste runs to delicious repasts or soft music and a delightful partner, or a combination of the two. The chef and his aides will be ready for us at 6.30 o'clock.

—ED. BAILEY, R.T.,
Sub-Editor.

NEWFOUNDLAND DIVISION C.S.R.T.

SECOND ANNUAL CONVENTION

On Nov. 5th, 6th and 7th, 1953, the Newfoundland Division of the C.S.R.T. held their second annual convention in the committee room of The St. John's General Hospital.

The opening session was opened by Dr. L. Miller, Deputy Minister of Health, and 1st Lieut. C. Ward, M.D., Chief Radiologist at Pepperwell Air Force Base.

The afternoon session consisted of four scientific papers: (1) "Producing a Good Radiograph," by Dr. W. J. Higgins. (2) "Duties of an X-Ray Technician," by Eric Calver, R.T. (3) "The Technician and the Patient," by Mrs. M. Maher, R.T. This paper won honourable mention in the final judging by Drs. Murphy and Higgins. And (4) "Dangers of X-Radiation," by Fred Willar, R.T.

Nov. 6th, 1953.

Three scientific papers were presented in the morning: (1) "Radiography as a Career," by Dr. H. B. Murphy, Chief Radiologist at the St. John's General Hospital. (2) "Intravenous Pyelography," by Sister Magdalene of St. Clare's Mercy Hospital, who won the $50.00 prize money donated by Charles R. Bell, representative of Picker X-Ray Corporation. This paper deserved this recognition without a doubt in the minds of the Radiologists and, I am sure, the technicians present. A demonstration of tomographic films with a commentary by Miss Anne Rendell, R.T., then followed.

At 1 p.m. a luncheon through the courtesy of Charles R. Bell was held at Frost's Restaurant. At this luncheon the $50.00 prize won by Sister Magdalene was presented to Miss Elizabeth Baker, R.N., R.T., who accepted on behalf of Sister Magdalene who was unable to be present.

In the afternoon a business session followed, at which time the officers for the year were elected as follows: President, Mr. Eric Calver, R.T.; vice-president, Mr. C. L. Roberts, R.T.; secretary, Miss Ernestine Shute, R.T.; treasurer, Sister Magdalene; director, Mr. Thomas Murphy.

A display of literature, etc., was also in evidence through the courtesy of Tootons Ltd.

Nov. 7th, 1953.

At the morning session Dr. W. J. Higgins gave a short talk on Bronchograms with a demonstration of films and ably answered questions. Mr. Murphy then gave a demonstration of the Picker Polorid One Minute Processing Unit which really amazed those technicians present.

After a vote of thanks to the outgoing executive the technicians were taken on a tour of the various city hospitals.

At 5.30 p.m. the second annual convention was brought to a successful close with a cocktail party through the courtesy of Heap & Partners (Nfld.) Ltd. at the Newfoundland Hotel.

—ERNESTINE SHUTE, R.T.,
Secretary.

CAPE BRETON SECTION

The general meeting of the Cape Breton Branch of the Nova Scotia Division was held at St. Joseph's Hospital, Glace Bay, November 30th at 8 p.m. with about fifteen members in attendance.

The chief discussion of the evening concerned the plans for the 1954 Provincial Convention which is to be held in Sydney, and various committees were set up.

A paper on the effects of x-rays on the blood-forming organs was presented by Dr. A. Grofri, Bacteriologist for the Glace Bay and Sydney district. Dr. Grofri stressed the importance of x-ray protection by having protective screens and also the need of a blood count at least every six months.

Meeting adjourned around 10.30 and was followed by an entertainment by Mr. C. McDougall who played the bagpipes, to the delight of all the Scotch who were present (Feast of St. Andrew). A delicious lunch was served by the Hospital Staff. See you at the January meeting.

—SISTER M. ROBERTA, R.T.,
Sub-Editor.

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Journal of the Canadian Society of Radiological Technicians

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EDITOR

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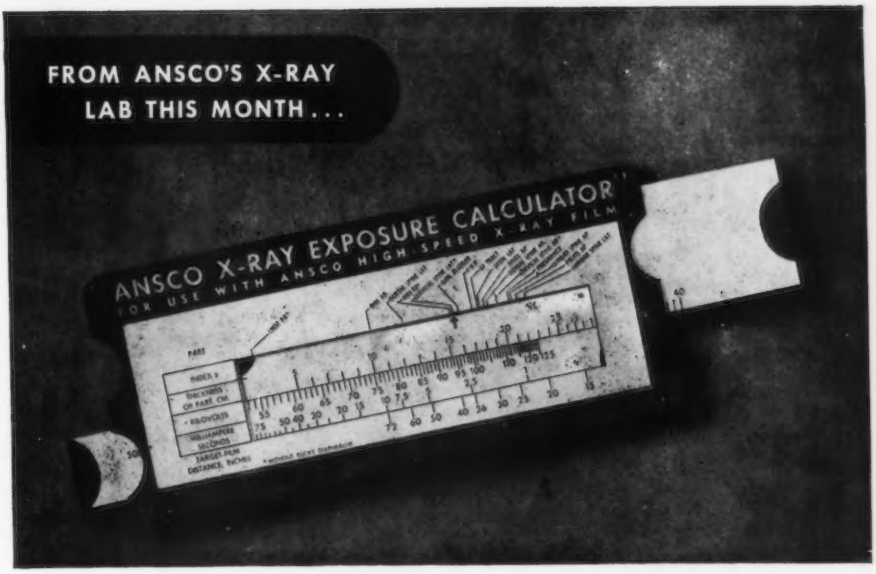

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LESLIE J. CARTWRIGHT, R.T.
EDITOR

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Jerman Memorial Lecture

RUSSELL H. MORGAN, M.D.

Russell H. Morgan, M.D., eminent radiologist of Johns Hopkins Hospital and a native of Ontario, was chosen to deliver the Jerman Memorial Lecture on the occasion of the Twenty-fifth Annual Meeting of The American Society of X-Ray Technicians and the First International Meeting of X-Ray Technicians (combining the American and Canadian Society meetings) in Toronto, Ontario, July 2, 1953.

Russell Morgan was born at London, Ontario, Canada, and become an American citizen in 1943. He received his M.D. degree at the University of Western Ontario in 1937. Dr. Morgan was resident in roentgenology at the University of Chicago Clinics in 1940-1942, Instructor in Roentgenology, University of Chicago, 1942-1943, Assistant Professor, 1943-1944, Associate Professor, 1946 and Professor of Radiology at the Johns Hopkins Hospital, 1946.

He was the winner of the Gold Medal Scientific Exhibit Award of The American Roentgen Ray Society in 1951 and is well known for his research in: Electronic Image Tubes, Fluoroscopic Screen Intensification, Angiocardiographic Studies of Congenital Heart Diseases, Automatic Timers, and Mass Photofluorographic methods. Most technicians are familiar with the Morgan timer, invented by Dr. Morgan about 1943.

Dr. Morgan is a member of the Education Advisory Committee of The American Society of X-Ray Technicians and is a member of The American Roentgen Ray Society, The American College of Radiology, American Trudeau Society and The Radiological Society of North America.

Roentgenoscopic Screen Intensification

By RUSSELL H. MORGAN, M.D.
Baltimore, Maryland

Part 1. Theory

IN THE past decade, there has considerable interest in methods by veloped among roentgenologists a which the brightness of roentgenoscopic screens may be intensified or increased. This interest has been aroused principally by the relatively poor detail provided by present-day roentgenoscopic screens and by the belief that this detail might be materially improved if screen brightness were increased by a factor of several thousand times. The basis for this belief may be found in the investigations of Chamberlain[1] and Hecht[3]. Chamberlain has demonstrated that roentgenograms made with roentgenoscopic screens in contact with film exhibit much more detail than the same screens when observed at roentgenoscopy; and Hecht has shown that the human eye, when viewing fields having a luminance approaching that encountered in roentgenoscopy (10^{-4} to 10^{-2} foot-lamberts) has a visual acuity or ability to perceive detail of only a small fraction of that occurring under normal lighting conditions (10 to 100 foot-lamberts). Hence, it appears that the poor performance of the roentgenoscope may be attributed to deficiencies of the human eye when operating at the low levels of illumination which occur during roentgenoscopy, rather than to any inherent imperfections in the roentgenoscope itself, and that this performance should be improved if the brightness of the screen were increased to levels at which the eye performs more satisfactorily.

As convincing as the foregoing evidence may be, the premise that an improvement in roentgenoscopic clarity will surely follow an increase in the brightness of the roentgenoscopic screen should not be wholly accepted until it is certain that the causes of the poor visual acuity which occurs at low levels of illumination will not also influence the performance of any man-made optical device which may be used to intensify screen brightness. It is entirely possible that the limitations of the human eye are caused by factors which also limit all types of optical systems, physical as well as physiologic. If this is the case, the use of an intensifying device in conjunction with the roentgenoscope will make little if any improvement in screen clarity.

In view of the foregoing, it may be well to ask what are the factors which control the clarity of roentgenoscopic vision. Over the years, there has accumulated a copious literature which indicates that these factors include the grain size of the roentgenoscopic screen, the geometric unsharpness of the roentgen beam, and the characteristics of the human eye. Although all of these factors impose limitations on the clarity with which roentgenoscopic images are visualized, there is recent evidence to indicate that another factor is more fundamental in the control of roentgenoscopic detail.[6,7]

The images appearing on the roentgenoscopic screen are produced by the projection of a roentgen beam through the

From the Department of Radiology, The Johns Hopkins University and Hospital. Jerman Memorial Lecture delivered at the First International Convention of X-Ray Technicians, Toronto, July 2, 1953.

anatomical structure which one wishes to visualize. Such a beam is composed of myriads of particles of energy called photons. On passing through the anatomical structure, many, and sometimes most, of these x-ray photons are absorbed by the structure; some, however, pass through to emerge on the other side and thence to fall on the roentgenoscopic screen. In the screen, these x-ray photons are converted into light, whereupon they may be seen by an observer seated in front of the screen.

Now if all anatomical tissues absorbed x-ray photons equally, the number of photons emerging to fall on the roentgenoscopic screen would be uniform from one portion of the screen to another, and hence the light generated by the screen would have no image pattern whatever. Fortunately, however, some tissues absorb more x-ray photons than others and hence the brightness of the roentgenoscopic screen is not constant from one point to another but instead varies in accordance with the configurations of the anatomical structures through which the radiation has passed. In this way, the light emitted by the roentgenoscopic screen bears an image pattern of the various anatomical structures.

From this description of the manner by which roentgenoscopic images are produced, it will be clear that the diagnostic information provided by a roentgenoscopic image is carried from the patient to the screen by the myriad of x-ray photons which comprise the x-ray beam. Indeed, each x-ray photon which is transmitted from the patient to the screen carries a certain small amount of diagnostic information and it is the sum of all of the increments of information carried by these photons which controls the total quantity of diagnostic information provided by the roentgenoscopic screen at any instant. The amount of information provided by the screen can never be greater than that carried by the photons which impinge on the screen. The amount of information, of course, can be less if such factors as grain size and geometric unsharpness are not adequate to utilize the information carried by the photons efficiently. The point that must be emphasized, however, is that the diagnostic information provided by a roentgenoscopic screen can be no greater than the sum total of all of the little increments of information carried to the screen from the patient by the x-ray photons of the roentgen beam. Since quantity of diagnostic information and clarity of detail are synonymous terms, it is evident that roentgenoscopic clarity is a function of the number of x-ray photons falling on the screen during the roentgenoscopic process.

Since each x-ray photon may be assumed to have associated with it a certain amount of diagnostic information, it follows that when a roentgen beam of high intensity is projected through a patient, the clarity of the roentgenoscopic images will be considerably better than when a beam of low intensity is used. In the first instance, there are a great many x-ray photons carrying diagnostic information to the screen, and hence the clarity of the resulting images is relatively good; in the second instance, the number of x-ray photons is smaller and hence less diagnostic information is brought to the screen with resulting degradation of image quality.

In passing it may be interesting to inquire why roentgenographic films provide so much more detail than roentgenoscopic screens. To answer this question it is necessary to point out that under normal

conditions, the human eye behaves as though it were a motion picture camera, operating at a speed of 5 frames per second. That is, the eye behaves as though five times each second its retina exposes itself for 1/5 second and transmits the resultant images to the brain. Now it is common practice to operate roentgenoscopic apparatus at 5 milliamperes. It is evident, then, that under conventional roentgenoscopy, the eye sees a series of exposures, each of which is 1 milliampere-second in value. Let us now examine the exposure values in roentgenography. In abdominal work, the exposure required to produce a satisfactory film, at a kilovoltage and tube-film distance equivalent to those used in roentgenoscopy, is of the order of 10 to 25 milliampere-seconds. Therefore, since a great many more x-ray photons are used in the exposure of the roentgenographic film than in the exposure of the eye through the roentgenoscopic screen, it is evident that a great deal more diagnostic information will be carried to the roentgenographic film than to the roentgenoscopic screen. The detail seen in the roentgenographic film therefore will be superior to that of the screen.

From this discussion, it may be reasonably concluded that if one wishes to see more at roentgenoscopy, one need only increase the milliamperage applied to the roentgen tube. Experience proves that such a conclusion is entirely valid. Indeed, if one operates the roentgenoscope at 50 milliamperes instead of 5 milliamperes, the detail which may be perceived on the screen is considerably greater. Perhaps such an experiment proves better than in any other way the fact that grain size in the roentgenoscopic screen is not a fundamental controlling factor affecting clarity of detail. If grain size were the controlling factor, the increase in milliamperage from 5 to 50 milliamperes would not have produced any change in visible detail whatsoever.

The question may now be asked as to what will happen to roentgenoscopic clarity if one brightens the screen, not by increasing the milliamperage of the roentgen tube but by introducing into the roentgenoscopic process a screen intensifier of some sort or other. On the basis of the preceding discussion, it would appear that no increase in clarity should occur. Even if the roentgenoscopic screen is made brighter by a screen intensifier, the fact that the milliamperage on the roentgen tube and, hence, the number of x-ray photons which take part in the roentgenoscopic process are not increased, indicates that no more diagnostic information is carried from the patient to the screen and hence no improvement in clarity of detail can be expected. The only circumstance under which this reasoning will not be valid is one which occurs if the eye under conventional roentgenoscopic practice does not utilize 100 per cent of the information transmitted from the patient to the screen by the x-ray beam's photons. Under such a circumstance, it might be possible by means of a screen intensifier to improve conditions in such a way that greater utilization of photon information could be effected.

On the basis of measurements made by Sturm and Morgan[7] in a physiologic study of roentgenoscopic vision undertaken a few years ago, it appears that the human eye, during conventional roentgenoscopy, utilizes the diagnostic information of only a small fraction (about 1 to 5 per cent) of the x-ray photons transmitted from patient to screen. Hence, if it were possible, by the introduction of a screen in-

tensifier into the roentgenoscopic process, to improve the utilization of x-ray photons from this very low level to a level of say 100 per cent, a considerable improvement in the diagnostic clarity of the roentgenoscopic screen could be developed. For example, an increase of the efficiency of the roentgenoscopic process from 2 per cent to 100 per cent would effect an improvement in the screen's detail equivalent to that produced by an increase in the roentgen tube current from 5 milliamperes to 250 milliamperes. We know by experience that the improvement in detail with such a change in milliamperage is indeed very great. It therefore may be anticipated that the introduction of a screen intensification system which improves efficiency of roentgenoscopic vision may improve roentgenoscopy very materially.

It must be emphasized that the introduction of a screen intensification system into the roentgenoscopic process will, under no condition, improve the clarity of roentgenoscopic vision if it only increases the brightness of the roentgenoscopic screen and does not increase the efficiency of x-ray photon utilization over that which occurs under conventional roentgenoscopy. Indeed, if at conventional roentgenoscopy the eye utilized 100 per cent of the information carried from the patient to the screen by x-ray photons, no improvement in roentgenoscopic clarity could be expected under any circumstances. It is only the fact that the eye utilizes a small fraction of the information carried by the roentgen beam that screen intensification processes hold any promise whatsoever. Fortunately, there is considerable evidence to indicate that the roentgenoscopic process may be materialy improved by screen intensification methods. In fact, there is every reason to expect that ultimately the efficiency of roentgenoscopy can be improved from its present-day figure to a much higher level.

Part II. Screen Intensifier Research

Since it appears that a considerable improvement in roentgenoscopic quality may be achieved by the development of an efficient roentgenoscopic screen intensifier, work was begun a few years ago in at least three laboratories in this country to develop devices by which roentgenoscopic screens might be brightened or intensified. Coltman[2] at the Westinghouse laboratories in East Pittsburgh undertook investigations which have recently culminated in the development of an electronic image tube capable of intenisfying the roentgenoscopic screen approximately 300 times. A short time later Moon,[4] at the University of Chicago, began work directed toward the development of a screen intensifier based on the "flying spot" system used in television. Although practical results have not yet been achieved, Moon anticipates large gains in screen brightness with this system.

Early in 1950, work was begun on the development of a screen intensifier at The Johns Hopkins Hospital.[5] It was hoped that gains in screen brightness of approximately 1,000 times or more might be achieved. Our first instrument was completed late in 1950. Since that time three additional units have been under construction.

Fig. 1. Johns Hopkins fluoroscopic screen intensifier. (From Radiology, 57: 556, 1951.)

Our first intensifier, arranged for clinical study, is illustrated in Figure 1. It comprises three principal units: (A) A conventional roentgenoscopic x-ray generator operating at kilovoltages ranging from 70 to 100 kvp. and at a tube current of 5 milliamperes; (B) An x-ray image detector, and (C) A fluoroscopic viewing unit.

The principles upon which these three units operate together may be visualized in Figure 2. The x-rays produced by the roentgenoscopic generator, A, pass through the anatomical structure under examination, B, and enter the image detector unit. Within this unit the radiation first passes through a stationary wafer grid, C, and then impinges upon a fluorescent screen of the conventional zinc sulphite type, D. The images appearing on the fluorescent screen are then focused on a sensitive surface of an image orthicon, G, by a folded Schmidt optical system consisting of three plain mirrors, M, a corrector plate, P, and a spherical mirror, E.

The image orthicon, the photosensitive tube used in most television cameras, converts the fluorescent images into an electric current which is amplified many times, first by a preamplifier, H, and then by a final amplifier, J. Finally, the amplified current is applied to a television viewing tube or kinescope, K, where it produces on the viewing surface of the tube a brightened or intensified reproduction of the anatomical structure being examined. A pulse-forming unit, L, is also included in the apparatus to produce synchronizing pulses for sweeping the electron beams within the image orthican and the kinescope.

It will be observed from this description that the intensifier combines the optical principles of photofluorography with the engineering principles of television. Such a combination permits considerable flexibility in the design and operation of the

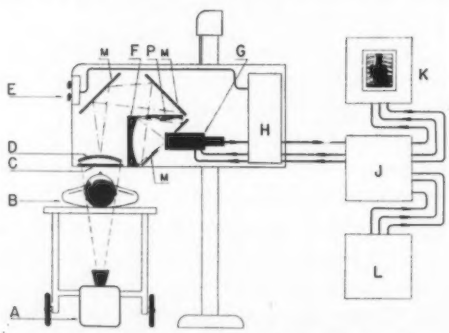

Fig. 2. Schematic diagram of the Johns Hopkins fluoroscopic screen intensifier. (A) Fluoroscopic x-ray generator. (B) Patient under examination. (C) Wafer grid. (D) Fluoroscopic screen. (E) Intensifier controls. (M) Plane mirrors. (P) Corrector plate of Schmidt optical system. (F) Spherical mirror of Schmidt optical system. (G) Image orthicon. (H) Preamplifier. (J) Final amplifier. (K) Viewing unit. (L) Pulse former for generating electrical pulses which sweep the electron beams of the image orthicon and kinescope in synchrony with one another. From Radiology, 57:557, 1951.)

instrument. The size of the field of examination, for example, need not be inconveniently small as in the case of screen intensifiers of the image-tube type, but instead may approach the size of conventional roentgenoscopes through proper design of the optical system. Furthermore, the inclusion of contrast controls in the amplifier circuits permits one to increase the relatively low contrast levels characteristic of roentgenoscopy to contrast levels much more nearly in line with those levels seen in x-ray films. Indeed, if desired, the contrast levels may be made to exceed by several times that provided by normal roentgenographic film. A considerable improvement in the clarity of image reproduction may thereby be obtained. Also, the circuits may be arranged to include a phasing switch with which the images recorded on a viewing screen may be made to appear either in their positive form as they normally occur on conventional roentgenoscopic screens, or in their negative form as they normally appear in x-ray films. Such an arrangement allows the radiologist to select the type of image rendition that is most satisfactory to him.

In chest roentgenoscopy, the brightness levels yielded by this screen intensifier are approximately 1,000 times greater than those provided by conventional roentgenoscopes; in abdominal roentgenoscopy, the gains are of the order of 10,000 times. Such intensifications bring the level of screen illumination to approximately 100-foot lamberts during examination of both the chest and abdomen. Since this level of illumination is well within the range in which cone vision is used, no dark adaptation is needed prior to the use of the intensifier.

The resolution or clarity of reproduction yielded by the instrument is approximately 50 to 100 per cent greater than that provided by conventional roentgenoscopy. This resolution falls considerably short of the limits which seem possible on theoretical grounds. If the intensifier improved the efficiency of the roentgenoscopic process from the normal level of about 2 per cent to the ultimate level of 100 per cent, one would expect an improvement in resolution of approximately 7 times. It appears, therefore, that our present screen intensifiers are operating at an efficiency of something less than 100 per cent; a figure of 10 per cent seems more likely.

Fig. 3. Several frames of a roentgen motion picture of a barium enema taken under conventional roentgenoscopic conditions.

It is hardly surprising that our first work failed to meet the ultimate objective

of 100 per cent efficiency. Initial experiments seldom have such a fortunate outcome. However, now that satisfactory gains in screen brightness may be

Fig. 4. Projection kinescope for demonstration of fluoroscopy to large audiences. From Radiolcgy, 57: 559, 1951.)

achieved, future efforts will be directed toward improvements in screen clarity. Experimental studies now in progress make it appear that such improvements will eventually be forthcoming.

Although we have designed our screen intensifier for experimentation in standard roentgenoscopic techniques, there are two other applications where we believe the instrument may be quite useful. First, it has been rather easy to make motion pictures directly from the kinescopic screen. These films, unlike those made under more conventional cineroentgenographic conditions, may be exposed with the x-ray generator operating at normal roentgenoscopic kilovoltage and tube current. Hence, one may make x-ray motion pictures covering a period of several minutes rather than a period of a few seconds as has been the case in the past. In the making of x-ray motion pictures directly from the kinescopic screen it is of course necessary to synchronize the motion picture camera with the operation of both the x-ray generator and the screen intensifier. Such synchronization constitutes a relatively simple engineering problem, however, which has been overcome in practice with little difficulty. In Figure 3, there is reproduced a strip of 16 mm. motion picture film exposed directly from the face of the screen intensifier's kinescopic screen. The sequence shows a portion of a barium enema administered to a child measuring 10 cm. in thickness.

Another characteristic of the intensifier which has been of some value is the ease with which the amplified current may be applied to a projection kinescope. Such a kinescope projects its images on a screen similar to that used for the projection of of lantern slides. The fluoroscopic patterns, therefore, may be viewed by several persons rather than a few. With such a projection kinescope, it appears feasible to teach roentgenoscopy to medical students, physicians, and technicians with a facility which has not heretofore been possible.

The projection kinescope which we are currently using is shown in Figure 4. As will be seen from the size of the screen, the projected images cover a field 3 x 4 feet. The images are almost as bright as those produced by a conventional slide projector. They therefore can be viewed without dark adaptation by the persons observing the screen. The clarity of reproduction possible with the projection kinescope seems almost as good as that seen on the standard kinescope of the screen intensifier. For example, the details of pulsating vascular structures within the chest can be easily seen by a group of 25 to 30 medical students seated before the screen.

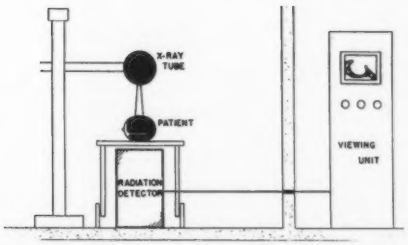

Fig. 5. Schematic diagram showing application of screen intensification to roentgen therapy. Apparatus permits precise localization of radiation to desired region of treatment.

It appears that screen intensification methods are rapidly reaching the stage where they may be applied widely in clinical roentgenoscopy. Commercial production of the roentgenoscopic image tube designed by Coltman is now in progress at the Westinghouse Electric Corporation. These screen intensifiers will be available for routine clinical use within a short time. Although it will be somewhat longer before screen intensifiers of the type which have been described here will be generally available, it appears that they will have an even wider clinical application than the image tube type of intensifier. We have seen how the Johns Hopkins Intensifier may be readily adapted to the presentation of roentgenoscopy to sizable audiences; such intensifiers therefore have a considerable application in the teaching of radiologic techniques and diagnostic methods.

Another screen intensification application which we have recently developed and which bids fair to have an important place in radiology, is in the field of radiation therapy. We have found that when the screen intensifier is adapted to a radiation therapy installation as shown in the schematic diagram of Figure 5, the tissues undergoing radiation therapy may be continuously visualized in safety by the radiotherapist during treatment. The exactness with which radiation may be directed to a lesion obviously can be enormously improved by this technique.

It is too early yet to determine all of the effects which screen intensification methods will have on the practice of radiology. It appears, however, that intensification systems, even after they become practical clinical tools, will be limited by the relatively high cost to use in the larger institutions of the country for some time. It also appears that screen intensifiers will supplement rather than replace the diagnostic apparatus which we now have. There seems to be no reason to believe that intensification systems will in any way revolutionize radiology; instead, it is likely that they will merely contribute to the steady evolution which has long been taking place since Roentgen discovered the x-ray slightly more than half a century ago.

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Radiography of the Sternoclavicular Articulation

By WALLACE R. BARRONG, R.T.

Cottage Grove, Oregon

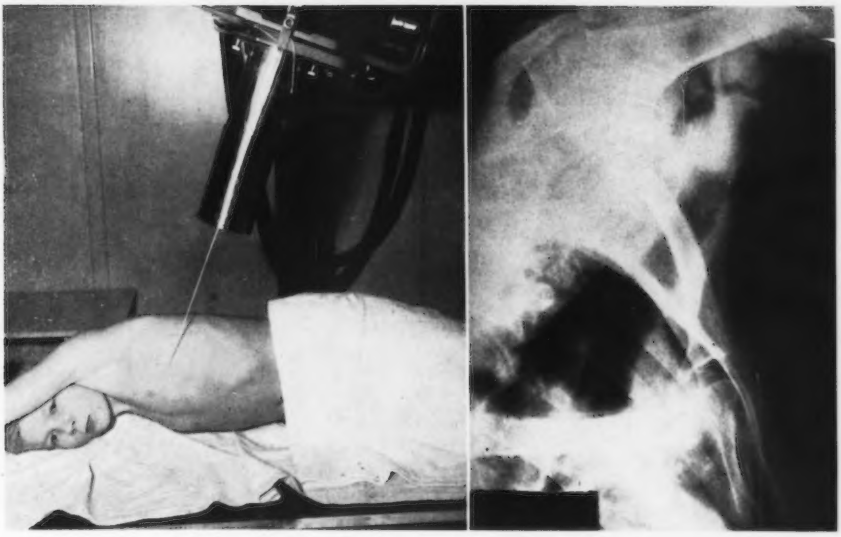
IN CHOOSING the subject "Radiography of the Sternoclavicular Articulation," it is not suggested that this method of obtaining radiographs of the sterno-clavicular joint will replace the necessary routine views. However, through study of the routine views, we feel certain there is a need for a new technique which is simple in both positioning and technical procedure, and which will offer a relatively unobstructed view of the sternoclavicular joint. In order to assist in analyzing the problem, the anatomy of this area is presented.

ANATOMY

Let us first make a brief resumé of the anatomy pertaining to the sternoclavicular articulation. The sternoclavicular joint is an example of an arthrodial diarthrosis. Let us think of the sternal end of the clavicle as somewhat triangular in outine, having its most prominent angle directed inferiorly and posteriorly. The anterior and posterior sides of the triangle are slightly roughened for the ligaments, while the base is smooth and rounded, due to the prolongation of the articular surface to the inferior aspect of the bone. In the anteroposterior direction, the articular surface tends to be concave; however, vertically it is slightly convex. An articular facet situated on the superior lateral angle of the manubrium sterni, but in a plane slightly behind the suprasternal notch, articulates with the clavicle. The distal end of the clavicle articulates with the acromion process of the scapula, and the proximal end articulates with the first rib and the manubrium of the sternum.

Better yet, let us think of the clavicle as a comparatively long and slender bone that acts as a prop to keep the point of the shoulder out from the trunk. The inner extremity is large and rests with its flat surface on the upper and outer edge of the sternum. Its outer extremity is flattened, and it articulates by means of a gliding joint with the acromion process beneath by ligaments. The interclavicular ligaments unite the inner end of the sternum, and pass from one clavicle to the other across the top of the sternum. The anterior and posterior sternoclavicular and rhomboid, or costoclavicular ligaments, pass from the clavicle downward and forward to the first rib. There is a fibro-cartilaginous disc between the clavicle and sternum, forming two distinct joint cavities. The line of the joint slopes downward and outward. The sternoclavicular joint is overlain with the subclavius, deltoid, pectoralis major and minor, and sternomastoid muscles. The sternum consists of three pieces: the manubrium or presternum, the gladiolus or mesosternum, and the xiphoid cartilage or metasternum.

Presented at the First International Convention of the Canadian Society of Radiological Technicians and the American Society of X-Ray Technicians, Toronto, June 29, 1953.



POSITIONING OF PATIENT AND TECHNICAL FACTORS

Positioning the patient offers a challenge to the technician in radiography, as the head of the clavicle lies almost directly over the spine and is obstructed by the ribs, thus making a difficult presentation with routine views. The technique of radiographing the sternoclavicular articulation is accomplished in the following manner:

The patient is instructed to lie on the right side with the right arm projecting dorsally and the right shoulder and arm pulled toward the feet as much as possible; the left arm is placed over the angle of the jaw. (Position reversed for injury to the left sternoclavicular articulation.) Now the tube is angled 20 degrees toward the head, and the central ray centred to the clavicular articulation. This is best demonstrated by using the following technique: 75 ma., 6/10 of a second, about 78 to 85 kv.p. and 36-inch distance, using the bucky diaphragm (Fig. 1).

RESULTS

The advantages of this method offer an unobstructed view of the sternoclavicular articulation and, in addition to this, offers an excellent view of the 7th cervical and 1st, 2nd and 3rd dorsal, or thoracic vertebrae (Fig. 2). The advantages offered by this particular view are many, as there are many injuries, new growths and bone infections communicating to the sternoclavicular articulation.

SUMMARY

A new technique is being presented for radiographic demonstration of the sternoclavicular articulation. The anatomy is discussed. The advantage of this procedure is a clear and unobstructed view of the sternoclavicular articulation. An excellent view of the 7th cervical and 1st, 2nd and 3rd thoracic vertebrae is also demonstrated. The technique is simple and can be readily mastered by any technician, and the procedure can be employed by any x-ray department, regardless of size.

Intravenous Pyelography

By SISTER M. MAGDALENE, R.N., R.T.
St. Clare's Mercy Hospital, St. John's, Newfoundland

THIS most interesting examination is of relatively recent origin, in that it was only in the year 1928 that Von Lichtenberg and Schwick used Uroselectan in intravenous pyleography. This was the first time that satisfactory intravenous pyelography was done, alalthough numerous attempts had previously been made.

Retrograde urography began in 1904 when, by the introduction of air into the urinary bladder, the first step was made toward the development of an artificial contrast medium for the demonstration of the urinary canals. In 1906 retrograde pyelography was performed with the first opaque medium, a collodial silver preparation, which is no longer used.

The purpose of this brief article, is to discuss some of the practical aspects involved in the production of good intravenous pyelograms. As technicians, it is our duty to produce radiographs that will give information the diagnostician expects. If we succeed, intravenous pyelography will be frequently requested. Furthermore, in producing a satisfactory study, the patient may be spared the discomfort of a retrograde examination. The urologist then, will resort to retrograde pyelography, only when he desires to determine the function of a kidney to confirm any intravenous findings, or to determine findings when the intravenous method had failed.

PREPARATION OF THE PATIENT

On the day before the examination, the patient is given castor oil, 1½ ounces. Better preparation has been observed if the oil has been given early in the day. If given in the evening, the patient has an uncomfortable night and besides, the sudden emptying of the bowel often leaves it filled with gas, which is more objectionable than bowel shadows. Liquids are restricted after the evening meal, and no food or drink is given in the morning. The purpose of dehydrating the patient is to increase the specific gravity of the urine, as the contrast medium will give better shadows on the films if the urine is more concentrated. The patient is instructed to empty the bladder immediately before the examination and is then placed on the table in the supine position with the feet touching the footboard.

A large blanket folded and placed under the knees and an extra pillow under the head, will help to make the patient comfortable. These manoeuvers will also tend to place the kidneys parallel to the table top, closer to the film, and will ease the compression discomfort. The patient is centred to the film with the lower margin of the cassette even with the symphysis pubis. The thickness of part is measured over the diaphragmatic region and the technique adjusted.

A plain film of the kidney and bladder area is taken to eliminate the possibility of obscuring a calculus with the dye, to insure proper positioning and to determine the desired tissue density.

CONTRAST MEDIA

There are several suitable contrast agents on the market, the most popular being Diodrast, but Hippuran, Neo-Iopax or Urokon may be used. All of these have the same danger in that they may create an allergic reaction in the patient. The contrast medium we use is Diodrast 20cc for a patient of average size, but in

very obese individuals, in whom clear delineation is difficult to secure, a larger dose of 30cc may be given. Before giving the Diodrast and while the plain film is being developed a sensitivity test is made. This is done by placing a drop of the contrast medium in the conjunctival sac, or beneath the tongue, or it may be given by intradermal injection.

After the sensitivity test has been made and found to be negative, the Diodrast is injected very slowly. If five minutes is taken for the injection and the solution warmed to body temperature beforehand, there should be no side effects, except perhaps, a slight flushing of the face. If given too rapidly, the patient becomes nauseated and may start vomiting.

At all times, Adrenalin should be ready in case allergic reaction should occur following the injection.

COMPRESSION

We feel that compression properly applied is the secret of a good Urogram. This is accomplished by rolling a small sheet into a tight bundle large enough to fit between the iliac crests. It is applied just above the symphysis pubis, so that it lies directly over the sacrum and pelvic prominence posteriorly. An air-filled balloon or inflated blood-pressure cuff is placed above the sheet and beneath the restraining band. When the dye had been completely injected, the compression band is tightened until the patient shows signs of discomfort. At this point, we hope to have blocked the ureters to prevent the dye from leaking into the bladder before the kidneys are well filled.

TIME RELATIONSHIP IN MAKING RADIOGRAPHS

The proper time, after injection of the contrast medium, for making the radiographs varies with the patient. In a healthy young adult, the five and 10 minute radiographs always show good concentration if the patient had been properly prepared. In other patients when renal function is low, a longer time is needed for visualization. If the first film is developed immediately after exposure, it will serve as a guide, as to when the most intense shadows are likely to appear. In this way one can judge how long to wait between exposures and when the examination should be terminated.

Suspected stone in Ureter: If a shadow falls directly over the Ureter, an extra oblique film (with the affected side down) may be taken. If the shadow is not in the Ureter, it will separate itself from the Ureter in the oblique view.

In cases of Hydroenphrosis, several hours may be needed before proper visualization of the kidney may occur.

If a general routine is to be adopted, radiographs should be made at 5, 15 and 25 minute intervals followed by an upright view for ptosis. In the upright film the compression is released and we should get a good view of the lower ends of the Ureters.

I might remark here that a pyelogram should not be repeated before 48 hours have elapsed because of the possibility of inducing a temporary anuria. The method of procedure including the number of exposures to be made, depends most of all upon the condition with which one is dealing. For this reason the technician should have a working knowledge of the common abnormalities. In this way only, will he know what views to take, and when to take them, and therefore be a more intelligent assistant to the Radiologist.

Flower Radiography

By ELSIE JANE COX, R.T.
Greensboro, North Carolina

THE purpose of this paper is to discuss my hobby, flower radiography, with friends and fellow x-ray technicians. I recognize and appreciate the excellent work that has been done along this line in the research laboratories, by radiologists, and by x-ray technicians. I share with them the thrill of interesting and satisfying results as well as the fatigue brought on by the many hours of fruitless work.

I became interested in the application of soft radiation as it disclosed the structure of flowers for the mere beauty it demonstrated, but as an x-ray technician I realized that in order to demonstrate this structural beauty many technical factors must be considered and worked out. These factors I wish to discuss briefly now.

My first consideration was kilovoltage. Accepting kilovoltage as the penetrating factor in making a radiograph, I assumed I would need low kilovoltage, say 5 to 10 kv.p., in order to obtain the necessary soft, long wave lengths of the electromagnetic spectrum. This factor, from an electrical standpoint, did not present a handicap or problem; low kilovoltage could be obtained.

Next came the three big letters MAS, milliampere seconds. I was confident that this factor could be handled in a flexible sort of way by using the milliampere and time combination to suit the need.

From the Physics Department, Woman's College of the University of North Carolina.

Presented at the First International Convention of the Canadian Scciety of Radiological Technicians and the American Society of X-Ray Technicians, Toronto, July 1, 1953.

Fig. 1.

Where then would I run into trouble? I decided it was filtration. If I needed soft, less penetrating wave lengths for my thin, fragile subjects, then I must have little or no filtration. It was evident to me, then, that I would have to consider the following problems:

1. Tube construction.
   (a) The oil in which the tube might be immersed.
   (b) The window of the tube.
   (c) The filter in the tube housing.
2. The focal-film distance as it related to the air, inherent filtration.
3. The material used to keep the sensitive x-ray film light proof.

Now let us consider each of these three problems individually. First, tube construction. As you know, the x-ray tubes which are immersed in oil have variable

quantities of oil, depending on the tube design, and this oil acts as a filter for the emerging x-rays. We also realize that the window of any x-ray tube plays a major role. If soft radiation is desired, then the thickness and composition of the window must be considered. As to thickness, the thinner the glass window, the less the absorption of the soft rays. As to composition, I can only make the statement that the "berillium window" has given me the best results. The filter found in most of the diagnostic x-ray units must also be considered. If the function of this filter is to absorb the soft radiation detrimental to the skin, it must be removed if soft rays are to be obtained. If this filter is removable, then this problem can easily be handled. Theoretically, then, if I expected to obtain soft wave lengths I needed an x-ray tube with a small focal spot, no filtration by oil, a berillium window, and a removable filter.

Fig. 2.

The second problem dealing with filtration seemed to be the focal-film distance, because even the very air itself, between the tube and film, should act as a filter. Following up this theory dealing with focal-film distance, I found that the slightest change in distance proved a real problem. The application of the inverse square law offered no sinecure.

Fig. 3.

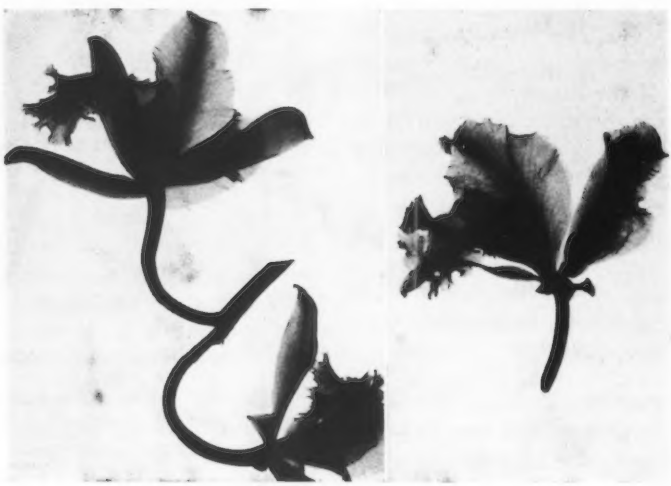
Third, the material or containers used to protect the x-ray film from light must not absorb too many of the soft rays. Considering this fact, I questioned the use

of the usual cardboard holders and cassettes. Figure 1 shows a cardboard ash tray and plants. In this print I tried, by

Fig. 4.

would be as a holder for the x-ray film. demonstrating the texture of the cardboard, to show how impracticable its use

Now, I am sure you will recognize that most of my statements so far have been the results of daydreams and nightmares; now to work—and real work it turned out to be. I found the equipment with the above- described requisites in a superficial x-ray unit. The selection of kilovoltage turned out to be my first worry, for I could only estimate the number of kilovolts I was using for each exposure because there were no markings below 30 kv.p. on the meter. This condition made duplication of techniques very difficult. I spent hours employing the trial-and-error method on problem number two, focal-film distance. I have used varying distances for individual specimens, but because I wished to maintain a uniform size print for most of my work, I have usually used a distance of 27 inches for the 11 x 14 size film. The material which I have used to keep the sensitive x-ray film light proof has been the black interleaving paper which comes packed on some of our commercial x-ray film, but any light-proof paper should do. In a few instances, I have used no protective



Fgi. 5.

covering at all, but made the x-ray exposure in total darkness. I can show a 14 x 34-inch film and slides to demonstrate the results of this procedure. I have used both screen and no-screen films for my work in flower radiography. Figure 2, with the technical factors of 10 kv.p., 45 mas., 27 inches, is an example of the paper prints I have obtained by using screen films, while Figure 3 was made from a no-screen film negative using a technique of 7 kv.p., 18 mas., 27 inches. I have used no special chemicals or techniques for the processing of my films—only routine radiographic darkroom procedures were adhered to.

My subject matter has been everything from a holly branch, for Christmas cards, to the lovely fragile orchid. The chemical composition and thickness of my many specimens has proved most interesting. Take the rose for instance, it has varied structure—petals, leaves, and stem; each part requires a different technique to demonstrate its own structure; however, the over-all beauty and gracefulness can be displayed with one exposure (Fig. 4). I have found the orchid to be my most interesting and expensive subject. I still wonder if it is the botanical structure, the graceful pattern, the moisture content, or just the over-all loveliness it portrays that makes it my first love. Figure 5a, to me, depicts sheer beauty and gracefulness; as for detail, Figure 5b, the semi-lateral projection of an orchid, shows a bruise that was not apparent visually. I also have attempted to demonstrate some of the work I have done with dry floral materials in Figures 3 and 6. Certainly, here the moisture content, or rather the absence of the moisture, needed to be considered in choosing a technique. My garden club friends use the term "arrangement" in describing my work, but professionally you and I would use the words positioning and projection. This I have tried to illustrate in Figure 2—a and b, giving two entirely different pictures or impressions of the same flower, the lily.

Fig. 6.

There are so many fine photographic papers on the market to-day that one's individual choice is practically unlimited; therefore, I do not feel it necessary to elaborate on this phase of the work. Personally, I like the positive paper prints, and the contact method gave me satisfactory results. I have used the enlarging method only when it was necessary to demonstrate a small segment of one particular negative.

In conclusion, I would make the following statements. I have used only the above factors and techniques to give the results I have described and demonstrated, but I am sure there are many other individuals who have or will achieve similar or far better results with other techniques. The pleasures and rewards derived from the long, long hours spent with my hobby extend far beyond my own

personal satisfaction. In exhibiting my work, I have found that the artist expressed pleasure in beauty of line, form, and cubism; the botanist in the demonstration of the internal structure; garden club groups in materials and arrangements; while the physicist was interested in the technical factors involved in producing the negatives, slides, and paper prints. Therefore, I feel that this work has contributed something toward the appreciation of many lay groups and for the everyday x-ray technician.

SUMMARY

The following factors in flower radiography have been discussed:

1. Equipment used: superficial therapy unit.
2. Technique: kv.p. 5 to 15; mas. 7 to 60; distance 7 to 48 inches.
3. Film: screen and no-screen.
4. Processing: routine.
5. Subject matter: flowers and plants.
6. Paper printing: contact and enlarging.
7. Slides: for demonstration.

Saint John—the 1954 Convention City

12th C.S.R.T. ANNUAL CONVENTION

ADMIRAL BEATTY HOTEL

SAINT JOHN, NEW BRUNSWICK, SEPTEMBER 1st, 2nd, 3rd, 4th

CONVENTION CHAIRMEN

General Chairman	—Darrell Liston, Lancaster D.V.A. Hospital, Lancaster.
Finance	—Clare Marie McGrath, St. Joseph's Hospital, Saint John.
Programme	—Kay Creelman, Moncton City Hospital, Moncton.
Entertainment	—Barbara McLean, Saint John General Hospital, Saint John.
Sister's Housing Committee	Sr. M. deLellis, —St. Joseph's Hospital, Saint John.
Exhibit	—William Beatteay, Lancaster D.V.A. Hospital, Lancaster.
Reception and Registration	Frances Peters, —Saint John General Hospital, Saint John.
Publicity	—Lois McNair, Lancaster D.V.A. Hospital, Lancaster. Margaret Fitzgerald, Lancaster D.V.A. Hospital, Lancaster.

The Focal Spot

Journal of the Canadian Society of Radiological Technicians

LESLIE J. CARTWRIGHT, R.T.
EDITOR

Volume 11 TORONTO 1954 NO. 1 *Issue No. 41*

Editorial Comment

THIS MATTER OF WRITING PAPERS

In the hope of stimulating the interest of the members in writing papers for *The Focal Spot* the Board of Examiners a couple of years ago offered an annual prize of twenty-five dollars for the best paper by an R.T., and a fifteen dollar award for the best paper by a Student Member. These awards were creditably won during 1952; in fact a third paper was considered of sufficient worth to merit an extra award added by the Directors of *The Focal Spot.* Incidentally this latter paper was recently reprinted in the Journal of the Australasian Institute of Radiography, *The Radiographer.*

In order to avoid the serve competition from those giving papers at conventions, which papers are often published in *The Focal Spot,* it was decided to restrict *The Focal Spot* awards to those writing articles especially for the journal, although these papers can have been delivered at a sectional meeting prior to publication.

During 1953 only three articles in this category were contributed. These were all good articles or they would not have been published, but they are too few to run a competition on. A fourth article on improved darkroom technic was excellent but unfortunately is not eligible as the writer is not an x-ray technician.

After consultation with the Examining Board and three prominent members of the Society, the opinion has been reached that no award can be granted for 1953. It seems only fair, however, that the few articles which were eligible during the past year should be held in abeyance and considered with those of 1954 — if we can persuade R.T.'s and Students to write papers during the coming year.

EDITORIAL COMMENT

There were 1,100 members (including students) listed in the last Registry. *The Focal Spot* has a circulation of about 1,500 copies per issue. Surely from some 1,400 people interested in their vocation we can get eight to contribute two articles per issue, or better still twelve or sixteen to write three or four articles per issue.

Focal Spot articles have been reprinted in the British, United States and Australian journals and these four publications cover the English-speaking radiographic world. This alone should spur our Canadian pride to produce articles which are good enough to be republished elsewhere, as well as the gratification to the writer on seeing his ideas publicized.

Members have sometimes written asking for suggestions as to what they should write a paper about. It is difficult to advise people in this direction; as difficult as if one were asked to suggest a plot for a novel or a theme for a musical composition. This is really something which has to spring from the inner consciousness of the writer; in fact until one puts pen to paper or fingers to the typewriter keys one may have only a general idea of what will emerge. "Everything has been said before," you think. But think again. Think of your own work. It is practically certain that some of your methods are different from those used elsewhere. You have evolved them because they seemed an improvement. Start writing about that and you will find that everything has not been said before. Don't just think about writing a paper; start writing it and you will find your ideas will begin to flow. Get your ideas on paper as they emerge from your thoughts. Then go through it again and polish it up; clarify the ideas expressed; eliminate unnecessary phrases. Or, on the other hand you may find some parts which can do with further amplification. The main thing is to start, both for the information of your fellow-workers and your own satisfaction.

Sub-Editors should be on the lookout for good papers at their sectional meetings and if given verbatim should see if they can persuade the lecturer to put it into written form.

NEWS FROM AUSTRALIA

In an interesting Christmas letter from Mr. Donald Carter, M.A.I.R., Editor of *The Radiographer* of Australia, the writer tells of his interest in reading of our International Convention in *The Focal Spot*. Early in December the Australasian Institute held its Annual Convention in Sydney, N.S.W., and for the first time introduced

Refresher Courses which proved very successful and will be extended in future. A peculiar situation from our viewpoint in Canada is that the Australian Society's worst headache during '53 was a State law on Compulsory Unionism which, the writer says, "caught us unprepared and we spent a lot of time figuring out ways and means of not being implicated in organizations for which we had no liking. Mr. Carter says there is an increasing use of the 0.3 mm. tube for magnification technic, especially in military hospitals for examining the vertrabral laminae and also in fluoroscopy. Mr. George Roberts of Fort Erie, Ont., who sent in the photo of the x-ray tube desk lamp (F.S. Vol. 10, No. 38) will be interested to know that Mr. Carter saw one in Australia patterned on this and is himself in the process of making another. The Editor of *The Radiographer* also remarks wryly that an anatomy lecturer got hold of his copy of Dr. Mallett's "Anatomy for X-Ray Technicians" and he hasn't seen it since! "It is a most excellent work," he concludes. His letter finishes with best wishes to all Canadian radiographers for a happy and successful 1954.

ERMINDA CLARKE AWARDED HON. M.S.R.

Following the International Convention Miss Erminda Clarke, the energetic chairman of the American Registry, left for a tour of Europe concluding with her attendance at a meeting of the British Society of Radiographers at which she was presented with an Honorary Membership in the British Society. Miss Clarke described her European experiences in a very interesting manner and also outlined the events of the International convention. After conveying to her British colleagues greetings from the American and Canadian Societies, Miss Clarke presented Mr. F. Melville, General Secretary of the British Society, with a certificate as an Honorary Registered Technician.

VETERINARY X-RAY SOCIETY FORMED

Toronto set another record for international convention attendance during the summer when the 90th annual meeting of the American Veterinary Medical Association was held there. Three thousand five hundred and sixteen people attended, 400 more than the previous record for the society at their 1951 Milwaukee meeting. At this meeting the Veterinary Radiology Society was formed, Dr. N. B. Tennille of Stillwater, Olkahoma, being appointed as chairman of the organization committee.

We would like to express our appreciation to *The X-Ray Techniaian* for allowing us to use the cuts illustrating the First International Convention articles appearing in this issue.

SCIENTIFIC SESSION, FIRST INTERNATIONAL CONVENTION OF X-RAY TECHNICIANS

PRESENTATION OF WELCH MEMORIAL LECTURE, JULY 1, 1953

Results of November 1953 C.S.R.T. Examinations

ALBERTA

William Andrais
Patricia Barry
Joan McKay Campbell
Yula Jane Cheney
Margaret Hyde Falkenberg
Marcia Geary
Ruby Joan Kassian
Betty Mae Peterson
Daria Romaniuk

BRITISH COLUMBIA

Jean Crombie Armitage
Elaine Signe Blake
Harold Bennett Bromley
Margaret Christina Findlater
Ethne Gwendolyn Gallichan
Ame Gee
Joan Stevenson Hodge
Margot Elizabeth Hope
Mary Barbara Jessop
Mary Love
Shirley Jeanne Lust
June Newton
Eleanor Isabel Robbins
Irmgarde Staks
Mary Stushnoff
Howard John Ward
Beverley Anne Willsie

MANITOBA

Dorothy Geraldine Foster
Murray Albert Isleifson
Marjorie Ruth Joyce
Marlene Reva Katz
Marian Edna Maclagan
Wilfred Leslie McDougall
James Wm. McDowell
Lorna Marion Mayers
Phyllis Gay Newman
Valerie Streckner
Shirley Thompson
Henriette Clara Toupin
Monique Julienne Turenne
Adeline Twerdochlib

NEW BRUNSWICK

Anne I. Millie
Rhoda Jean Morton
Koan Stratton
Lillian Thompson
June Wilson

NOVA SCOTIA

Sadie Campbell
Louise Marguerite Connolly
Clara Marie Douchet
Frederick John Fee
Nora Genet Flemming
Charlotte Ann Hall
Sheila Elizabeth Smith
Fanny Dorothy Welti

ONTARIO

Sister M. Antoinette
Doreen Birston
Edward J. Bishop
Delores Sigrid Fisher
Eleanor Shirley Jones
Harvey L. Jones
Joan Rita Kipper
Frank Kowal
John Gerald Lauzon
John Edward Maddia
Sr. Madeleine Du Sacre-Coeur
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Evelyn Moodie
Phyllis Marion Murray
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Stanley Pajk
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Margaret Isobel Robson
Pnina Rosenberg
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Ruth Maxine Thorner
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QUEBEC

Therese Bellavance
Vintha Carole Dunn
Simonne Gagne
Yolande Garand
Theresa Hache
Robert F. D. Hall
Lillian Karr
Madeleine Letendre
Renee Lippe
Sister Marie Du Divin Coeur
Barbara Morgan
Huguette Parent
Colette Plouffe
Jacqueline De Torregrosa
Lorraine Tremblay

SASKATCHEWAN

Alexander Donald Karapita
John George Leatherdale
Joanne Frances Martin
Albert David Mayo
Sister St. Thomas
Anne Tkach

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96 new applicants wrote; 14 partial rewrites and 1 complete rewrite.

★ ★ ★

FOCAL SPOT DISTRIBUTORS FOR 1954

Alberta: John Welch, R.T., Colonel Belcher Hospital, Calgary.

British Columbia: Mrs. E. I. Hood, R.N., R.T., 2175 West 16th Avenue, Vancouver.

Manitoba: Mr. Hugh Gibson, R.T., Brandon Sanatorium, Brandon.

New Brunswick: Miss Barbara MacLean, R.T., St. John General Hospital, Saint John.

Nova Scotia: Mr. Maurice Zwicker, R.T., Camp Hill Hospital, Halifax.

Ontario: Mr. Ray Fujimoto, B.Sc., R.T., Mountain Sanatorium, Hamilton.

Quebec: Mr. A. R. Cheffins, R.T., 4 St. Joseph Street, Ste. Anne de Bellevue.

Saskatchewan: Mr. Grant Dahl, R.T., Medical Arts Clinic, Regina.

A Card-Index for Your Journal File

By SISTER EDMUND CAMPION, S.C., R.T.,

Halifax Infirmary, Halifax, Nova Scotia

In the instruction of students and in the continuing education of graduate technicians, a well-organized library of textbooks and periodicals is a most valuable asset to the department of radiology. But very little specific information about libraries has been written for x-ray technicians. Indeed, the only such item I have seen in our Canadian and American journals is that published in the March, 1941, issue of *The X-Ray Technician*, "The Value of a Special Library Card Catalogue for Use in the Radiologic Department." In that excellent paper, Sister Aloysius Marie gave the general principles governing special departmental libraries, including the techniques of accessioning, classifying and cataloguing books and periodicals. Since the standard systems (Dewey Decimal and Library of Congress Classifications) are not sufficiently detailed for our purpose, she also devised a supplementary classification for a technicians' library, and subject-headings for a card-file index of current literature. The article is well worth study, but, unfortunately, few members seem to have access to Volume Twelve of *The X-Ray Technician*. The present writer has used that material as a guide in setting up the school journal-file at the Halifax Infirmary, and as a main source of information in preparing this paper.

Library Science being a broad and weighty subject, we shall here apply a radiographic principle and "cone down to avoid fogging." The precise area under consideration shall be the card-file classification and cataloguing of current literature pertaining to x-ray technology and allied fields.

In this connection, there comes to mind some wise nonsense from the pen of Lewis Carroll:

"She had fifty-nine boxes all beautifully packed
And the name neatly labelled on each,
But since she had forgotten to mention the fact,
They were all left behind on the beach."

Likewise, no matter how beautifully filed, how neatly labelled is our collection of books and journals, unless there is some way to "mention the fact" of their usefulness, they will be all left behind on the shelves, unread. Some directive towards purposeful reading and research must be provided as a necessary tool to make the library truly "functional." This tool is our card-index. To strike a modern and homely comparison—consider the lowly can-opener! Its value is only in relation to the good food to be extricated from cans. While there are many good foods not requiring a can-opener, much would be missed from the menu without that little tool. Now to push our simile: the card-index stands in relation to "education through reading" as the can-opener to "healthful nutrition," each being a device to expedite the respective process and result.

Where can one obtain a card-index for x-ray technical periodicals? Some of the larger and older organizations maintain an abstract-file service, sending out to members a regular package of prepared

cards all ready for filing and reference. This type of material is available on nursing problems from the American Nurses' Association, in connection with the American Journal of Nursing. To date, however, no similar service has been inaugurated for x-ray technicians. It is a dream of the future. Therefore, if one wants a card-file, it must be home-made. The making of it can become a fascinating hobby, as well as an excellent opportunity for teaching, especially if some of the students are allowed to participate in the project.

To set up a file, you will need the following materials, in addition to time, energy and patience:

(1) File cards: about 200 plain or faint-ruled cards, 4" x 6" or larger.

(2) Colored guide cards: these can easily be made from colored card-stock. It is well to have one set with small alphabet tabs, and a second set, in a contrasting color, with 1/3 or 1/2 width tabs for word-guides in the more important divisions.

(3) A suitable box or file-drawer. For this purpose, a firm cardboard ampule-box from the hospital pharmacy serves very well.

(3) A typewriter, for at least the heading on each card.

(5) A list of subject-headings (for example, those given below).

(6) Your journals, and, later, related material from other sources.

Various filing systems can be used, the commonest being the Dictionary File and the Subject File. The first is so named because the subject-cards are arranged in strictly alphabetical order with no regard for grouping of subject-matter. It is simple, and is preferred by many. The subject-file resembles the classified section of the telephone directory and is probably more suitable for our particular purpose, although it is somewhat complicated.

In preparing the cards, one may either start with only a few and add more subjects as needed, or relying on a sample list, prepare and file the entire set of blank cards before starting to make any entries upon them. The latter method has one advantage, in that several persons can work at the typing of headings and thus save time. Properly, all entries should be typewritten also, but this is a cumbersome procedure, and a neat, small handwriting or hand-lettering is acceptable.

Having prepared the cards, the next procedure is the actual listing of journal articles. It is rewarding to scan the text of each item, rather than rely on the printed index of the issue or volume. Titles are sometimes ambiguous. An article may contain more than one subject and require two listings. As far as possible, duplication of entries is avoided by the use of cross-references. For example, an item might belong to both "Biography" and "X-Ray History," but it is entered on either card, not both, as the cards are cross-referenced, bearing a "see also" notation next to the subject-heading. All entries under a certain heading are written on the same card, and a new card is started for the subject when the first is filled on both sides, as is done in the index of pathological cases. This makes for compactness, and for speed in locating material.

In order to have our temporary file ready for use within a reasonable length of time, we cut down the listing to the barest essentials, usually only the TITLE OF ARTICLE, JOURNAL, ISSUE (Month or Number), YEAR. Names of most journals are abbreviated, and a key to abbreviations is pasted into the cover of the box:—FS, XRT, and so forth, with

the complete and official title opposite each. At present, the Halifax Infirmary file covers only the material in the technicians' small classroom library — some thirty volumes of technicians' journals which contain approximately one thousand items. During 1954 we plan to retype the cards and branch out into a wider selection of material which is available in the radiologists' office, the hospital reference library and the nurses' library. Textbook references will also eventually be incorporated, and there are, in fact, almost limitless possibilities for improving the system. Author-and-title files may also be set up as time allows. Meanwhile, it works! Staff and student technicians now have a simple method of finding material on subjects assigned for Journal Club reports, or for supplementary reading on matters that interest them. We hope, too, that work of this kind will stimulate at least a few talented young people to contribute aritcles themselves to *The Focal Spot.*

The writer would be pleased to hear from any members who are working on similar library projects.

In the hope that it may assist those desirous of setting up a journal card-index in their own departments the following list of our card headings is appended.

ANATOMY, see also TECHNIQUE of specific structures.
APPARATUS, Angulators.
APPARATUS, cassettes.
APPARATUS, cones and diaphragms.
APPARATUS, electrical dangers.
APPARATUS, Fairchild camera.
APPARATUS, Filters (compensating).
See also TECHNIQUE, Pregnancy, special procedures.
APPARATUS, Lysholm grid.
APPARATUS, maintenance and care.
APPARATUS, Photoroentgen unit.
See also TECHNIQUE, chest. Mass survey.
APPARATUS, phototimer.
APPARATUS, Potter-Bucky diaphragm.
APPARATUS, rectifying valves.
APPARATUS, planigraph, tomograph.
APPARATUS, stationary grid.
See APPARATUS, Lysholm grid.
APPARATUS, Sweet eye localizer.
APPARATUS, transformers. See also X-RAY PHYSICS, voltage.
APPARATUS, x-ray tubes.
ARTERIOGRAPHY, see TECHNIQUE. Circulatory system. Arteriography.
ASEPTIC TECHNIQUE. See NURSING PROCEDURES, aseptic technique.
BEDSIDE ROENTGENOGRAPHY. See TECHNIQUE, bedside roentgenography.
BIBLIOGRAPHIES.
BIOGRAPHY. See also X-RAY HISTORY.
BRONCHI. BRONCHOGRAPHY. See subdivision under TECHNIQUE, chest.
BLOOD VESSELS, see subdivision under TECHNIQUE, circulatory system.
CALIBRATION, see subdivision under X-RAY, physics.
CHEMISTRY, general.
CHEMISTRY, processing: see X-RAY DEP'T, processing room. Chemistry.
CHILDREN, see TECHNIQUE, children.
CHOLECYSTOGRAPHY: see TECHNIQUE, gall bladder. Cholecystography.
CIRCULATORY SYSTEM, see TECHNIQUE, circulatory system.
CIVIL DEFENSE.
CYSTOSCOPY, see Subdivision Cystoscopy under TECHNIQUE, Urinary system.
DARKROOM, see X-RAY DEP'T, processing room.
DENTAL ROENTGENOGRAPHY: see TECHNIQUE, dental roentgenography.
ELECTRICAL SHOCK, see NURSING PROCEDURES in electrical shock.
ENCEPHALOGRAMS, see TECHNIQUE, skull. Encephalograms.
ETHICS, professional conduct.
ETHICS, medico-moral problems.
FILMS, artefacts.
FILMS, filing and identification.
FILMS, manufacture of, etc.
FOG, secondary radiation: see X-RAY, PHYSICS, x-ray energy, scattered radiation; also APPARATUS, cones, grids, etc.
FRACTURE SERVICE, see TECHNIQUE. Extremities . . .
HOUSEKEEPING, see X-RAY DEPARTMENT, housekeeping.
INTENSIFYING SCREENS.
INDUSTRIAL RADIOGRAPHY.
INTRASPINAL INJECTION, see TECHNIQUE, spine. Myelogram.
LAMINAGRAPH, see APPARATUS. Laminagraph.
LEGAL QUESTIONS, see X-RAY DEP'T, legal questions.
LYSHOLM GRID, see APPARATUS, Lysholm grid.
MATHEMATICS.
NURSING PROCEDURES, aseptic technique.
NURSING PROCEDURES, electrical shock. First Aid.
NURSING PROCEDURES, burns. First Aid.

A CARD INDEX FOR YOUR JOURNAL FILE

NURSING PROCEDURES, **lifting patients.**
See also TECHNIQUE **of specific area.**
OFFICE MANAGEMENT, see X-RAY DEP'T, **Office management.**
NURSING PROCEDURES, **patient preparation.**
OPAQUE MEDIA, see also subdivision OPAQUE MEDIA under TECHNIQUE **of specific structure.**
PATHOLOGY (re tissue density).
PELVIMETRY, see TECHNIQUE, pelvis. **Pelvimetry.**
PERSONNEL PROBLEMS, see also TECHNICIANS.
PHOTOGRAPHY.
PHYSICS, **general.**
PHYSICS, **x-ray.** See X-RAY, physics.
PLANIGRAPH, see APPARATUS. **Planigraph.**
PREGNANCY, see TECHNIQUE. **Pregnancy.**
PROCESSING ROOM, see X-RAY DEP'T, **processing room.**
PROTECTION, see X-RAY NECROSIS. **Precautions.**
PSYCHOLOGY.
PSYCHOLOGY, **mental patients.**
PUBLIC SPEAKING, **preparing manuscripts, etc.**
RADIUM THERAPY.
RECTIFICATION, see X-RAY, physics. **Rectification.**
SILVER RECLAMATION, see X-RAY DEP'T, **processing room. Silver reclamation.**
SOLUTIONS, see X-RAY DEP'T, **processing room, Chemistry.**
SPECIAL PROCEDURES, see name of specific procedure.
STEREOSCOPIC VIEWS, see TECHNIQUE . . . subdivision Stereo, under name of specific structure.
TECHNICIANS, **approved schools.**
TECHNICIANS, **education.**
TECHNICIANS, **education. Course outlines and lesson plans.**
TECHNICIANS, **education. Teaching aids.**
TECHNICIANS, **employment.**
TECHNICIANS, **qualifications.**
TECHNICIANS, **societies.**
TECHNIQUE (general—exposure factors, etc.)
TECHNIQUE, **abdomen—emergency work, etc.**
TECHNIQUE, **animals.** See TECHNIQUE, **veterinary radiology.**
TECHNIQUE, **ankle.** See TECHNIQUE, **extremities. Ankle.**
TECHNIQUE, **bedside roentgenography.**
TECHNIQUE, **bladder.** See TECHNIQUE, **urinary system.**
TECHNIQUE, **chest.**
TECHNIQUE, **chest. Children.**
TECHNIQUE, **chest. Lipiodol injection (bronchography).**
TECHNIQUE, **chest. Mass survey.** See also APPARATUS, photorogentgen unit.
TECHNIQUE, **chest. Stereoscopic views.**
TECHNIQUE, **children.**
TECHNIQUE, **cholecystography.** See TECHNIQUE, **gall bladder. Cholecystography.**
TECHNIQUE, **circulatory system. Angioraphy, Arteriography.**
TECHNIQUE, **circulatory system. Blood vessels.**
TECHNIQUE, **circulatory system. Heart.**
TECHNIQUE, **circulatory system. Venography.**
TECHNIQUE, **clavicle.** See also TECHNIQUE, **extremities. Shoulder.**
TECHNIQUE, **dental roentgenography.**
TECHNIQUE, **encephalography.** See TECHNIQUE, **skull. Encephalograms.**
TECHNIQUE, **extremities (general principles).**
TECHNIQUE, **extremities. Ankles.**
TECHNIQUE, **extremities. Arms.**
TECHNIQUE, **extremities. Elbows.**
TECHNIQUE, **extremities. Feet.**
TECHNIQUE, **extremities. Hands.**
TECHNIQUE, **extremtiies. Hip-nailing operations.** See also Ultra-speed processing.
TECHNIQUE, **extremities. Hip joint — special projections.**
TECHNIQUE, **extremities. Humerus.** See subdivision Arms, Shoulders.
TECHNIQUE, **extremities. Knees.**
TECHNIQUE, **exremities. Shoulders.** See also TECHNIQUE, clavicle; TECHNIQUE, scapula.
TECHNIQUE, **extremities, lower leg.**
TECHNIQUE, **extremities, thigh (shaft of femur).**
TECHNIQUE, **extremities, wrists.**
TECHNIQUE, **flowers and plants.**
TECHNIQUE, **foreign bodies (localization of).**
TECHNIQUE, **gall bladder. Cholecystography.**
TECHNIQUE, **gastro-intestinal tract. Special equipment.**
TECHNIQUE, **generative organs (salpingography, etc.).**
TECHNIQUE, **head.** See also TECHNIQUE, **skull.**
TECHNIQUE, **head. Facial bones.**
TECHNIQUE, **head. Mandible.**
TECHNIQUE, **head. Mastoids.**
TECHNIQUE, **head. Maxilla.**
TECHNIQUE, **head. Nasal bones.**
TECHNIQUE, **head. Nasal sinuses.**
TECHNIQUE, **head. Optic canal.**
TECHNIQUE, **head. Sphenoidal fissure.**
TECHNIQUE, **head. Temporo-mandibular joints.**
TECHNIQUE, **head. Zygoma.**
TECHNIQUE, **heart.** See TECHNIQUE, **circulatory system. Heart.**
TECHNIQUE, **kidneys.** See TECHNIQUE, **urinary tract. Kidneys.**
TECHNIQUE, **mandible.** See TECHNIQUE, **head. Mandible.**
TECHNIQUE, **occipital bone.** See TECHNIQUE, **head. Nasal sinuses.**
TECHNIQUE, **pelvis.**
TECHNIQUE, **petrous pyramid.** See TECHNIQUE, **skull. Petrous pyramid.**
TECHNIQUE, **placenta praevia.** See TECHNIQUE, **pregnancy. Placenta praevia.**
TECHNIQUE, **pelvimetry.** See also TECHNIQUE, **pregnancy. Placenta praevia.**
TECHNIQUE, **pneumoperitoneum.**
TECHNIQUE, **pregnancy.** See also TECHNIQUE, **pelvimetry.**
TECHNIQUE, **pregnancy. Placenta praevia.** See also TECHNIQUE, **pelvimetry.**
TECHNIQUE, **ribs.**

TECHNIQUE, scapula. See also TECHNIQUE, extremities. Shoulder.
TECHNIQUE, sella turcica. See TECHNIQUE, skull. Sella Turcica.
TECHNIQUE, sinuses (paranasal). See TECHNIQUE, head. Nasal sinuses.
TECHNIQUE, sinuses (pathological).
TECHNIQUE, skull. See also TECHNIQUE, head.
TECHNIQUE, skull. Encephalograms.
TECHNIQUE, skull. Occipital bone.
TECHNIQUE, skull. Petrous pyramid.
TECHNIQUE, skull. Sella Turcica.
TECHNIQUE, Skull. Temporal bone.
TECHNIQUE, skull. Ventriculograms.
TECHNIQUE, skull. Stereoscopic views.
TECHNIQUE, soft tissues.
TECHNIQUE, special positions and procedures. See also under name of specific procedure.
TECHNIQUE, spine. (General.)
TECHNIQUE, spine. Cervical.
TECHNIQUE, spine. Dorsal.
TECHNIQUE, spine. Lumbar.
TECHNIQUE, spine. Sacrum and coccyx.
TECHNIQUE, spine. Myelograms.
TECHNIQUE, teeth. See TECHNIQUE, dental roentgenography.
TECHNIQUE, sternum.
TECHNIQUE, stomach. See also TECHNIQUE, gastro-intestinal tract.
TECHNIQUE, urinary system.
TECHNIQUE, urinary system. Bladder, cystograms.
TECHNIQUE, urinary system. Cystoscopy.
TECHNIQUE, urinary system. Intravenous pyelography.
TECHNIQUE, urinary system. Opaque media.
TECHNIQUE, urinary system. Urethrography.
TECHNIQUE, ventriculograms. See TECHNIQUE, skull. Ventriculograms.
TECHNIQUE, veterinary radiology.
TERMINOLOGY and nomenclature.
THERAPY, see X-RAY THERAPY, RADIUM THERAPY.
TRACHEA, see TECHNIQUE, chest.
UROGRAPHY, see TECHNIQUE, urinary system.
X-RAY DEPARTMENT, design and furnishing, etc.
X-RAY DEPARTMENT, housekeeping.
X-RAY DEPARTMENT, legal questions.
X-RAY DEPARTMENT, library.
X-RAY DEPARTMENT, office records.
X-RAY DEPARTMENT, office management.
X-RAY DEPARTMENT, processing room. See also FILMS, INTENSIFYING SCREENS, PHOTOGRAPHY.
X-RAY DEPARTMENT, processing room. Chemistry (developer).
X-RAY DEPARTMENT, processing room. Chemistry (fixer).
X-RAY DEPARTMENT, processing room. Physical conditions.
X-RAY DEPARTMENT, processing room. Replenishing solutions.
X-RAY DEPARTMENT, processing room. Silver reclamation.
X-RAY DEPARTMENT, processing room. Ultra-speed processing. See also TECHNIQUE, extremities. Hip-nailing operations.
X-RAY ENERGY, see X-RAY PHYSICS, x-ray energy.
X-RAY NECROSIS, precautions.
X-RAY HISTORY, see also BIOGRAPHY.
X-RAY PHYSICS, see also APPARATUS and its subdivisions.
X-RAY PHYSICS, Amperage.
X-RAY PHYSICS, atomic energy.
X-RAY PHYSICS, calibration.
X-RAY PHYSICS, magnets.
X-RAY PHYSICS, rectification. See also APPARATUS, rectifying valves.
X-RAY PHYSICS, voltage. See also APPARATUS, transformers.
X-RAY PHYSICS, properties of roentgen rays.
X-RAY PHYSICS, x-ray energy.
X-RAY PHYSICS, x-ray energy. Scattered radiation. See also APPARATUS, cones, grids, etc.
X-RAY THERAPY.
X-RAY TUBES, see APPARATUS, x-ray tubes.
ZYGOMA, see TECHNIQUE, head. Zygoma.

Note: No entries are made upon the "*see*" cards; these are included in the file only as finding guides.

Entries are, however, made on the "*see also*" cards, which are true cross-references. It is not necessary to enter an article upon both the "*see also*" cards to which it is related. For example, an item might be entered on either BIOGRAPHY or X-RAY HISTORY, but not on both; the "*see also*" notation covers it adequately.

CARD INDEX HEADINGS AVAILABLE

We have in stock a limited number of sets of the headings as printed on the previous pages, printed on one side of the sheet only. These are available from the Editor at 50c a set, for the convenience of those who wish to use the system. They can be clipped and pasted on the cards to save typing headings.

REFERENCE

1. Borst, Sister Aloysius Marie, S.S.M., R.T., B.S.: The Value of a Special Library Card Catalog for Use in the Radiologic Department. 12:159 (March) 1941.

ONTARIO SOCIETY OF RADIOGRAPHERS

A MESSAGE FROM THE PRESIDENT

As we review the accomplishments of the O.S.R.T. in 1953 we must make even greater plans for 1954. During the past year your executive has endeavoured to carry out its responsibilities. Probably the outstanding project has been the preparation of the Registration Act of Ontario which is now almost ready for submission to the Provincial Government.

As President for 1954 I wish you all a Happy New Year and ask your active co-operation in helping to make the New Year a Happy and Progressive one for our Society.

A. J. STECHYSHYN, R.T.,
President, O.S.R.

A MESSAGE FROM THE SECRETARY-TREASURER

Now that Christmas is past your secretary is forced to think ahead to January 1st—billing time! The deadline for paying fees has been pushed one month ahead to help get all registered members' names on the C.S.R.T. roster in 1954, but we hope you will all try to send in your fees well in advance of the deadline.

By the way, those members who are not actively engaged in x-ray work but who want to keep up their Registration, can now change to the Inactive Membership category. You cannot hold office, or vote on Society matters, but you can revert to Active Membership whenever you resume full-time x-ray work. The fees for this membership are $1.00 for Canadian Society, $1.00 for Ontario, and $2.00 optional for *The Focal Spot* subscription and 50c for Bulletin. If you are interested in changing to Inactive Membership please let the Secretary know before January 1st, 1954, if at all possible.

May I take this opportunity to thank all those who replied so promptly to our leters of enquiry during the past year, and kept us posted on their changes of address. To one and all, may 1954 be a happy year for you.

—JANE MARTIN, R.T.,
Sec.-Treasurer, O.S.R.

CENTRAL SECTION

Over 70 members were present at the second meeting of the season which was held at the Kitchener-Waterloo Hospital on Wednesday, December 2nd, 1953.

The newly elected chairman, Mr. Hart Giffen, presided and the secretary for the year 1954, Miss Margaret Bartram, read the minutes of the previous meeting.

Dr. M. B. George, Radiologist at the Kitchener-Waterloo, welcomed the group as did Mr. Hatch, the superintendent of that hospital.

The only paper of the evening, entitled "The Emergency Ptaient," was ably given by Miss E. Dobson, R.T. This patient, which plagues us all in General Hospitals, "must have precedence . . . be handled with speed, calmness and assurance." "All work must be accurately done." The importance of "scout films" before routine views, and positioning was emphasized.

Mr. Anthony Stechyshyn, R.T., President of the Ontario Society, reported to the gathering on progress being made toward Registration by Legislation. Everything is in order for presentation to the Ontario Legislature early in 1954.

Mr. J. Guthrie reported that plans are progressing for the joint session of the New York Society of X-Ray Technicians and the O.S.R. The convention is to be held in Albany, N.Y., Oct. 16, 17th, and 18th, 1954. A car pool is being formed and it is hoped a goodly number will be able to take in this convention. The Ontario Society is expected to give one refresher course and eight papers.

Through the courtesy of Canadian Industries Limited and Mr. Geo. Ross, an excellent film entitled "The Dupont Story" was shown. This was followed by the Canadian Premiere of the "First International Convention A.S.X.T. and C.S.R.T." by the Kodak Company via Mr. James Seed.

The appreciation of all present was expressed by the chairman and the meeting was closed.

A tour was then made of the Department of Radiology and other parts of this beautiful hospital with its ultra-modern equipment and facilities. Following this a very enjoyable buffet lunch was served and all agreed that it was a fitting close to a worthwhile evening.

The next meeting is to be held at 8.00 p.m. on February 3rd, at St. Michael's Hospital, Toronto. Plans are under way for the fourth meeting around the middle of March at the Cancer Clinic, Hamilton General Hospital.

It is proposed to have a door prize with tickets at 25 cents at the sectional meetings with the objective of raising funds for the annual convention.

A meeting is being arranged for Friday, March 26th, at the Cancer Clinic, Hamilton General Hospital, at which the Cobalt Therapy unit will be the feature attraction.

—A. ARTHUR KING, R.T.,
Sub-Editor.

EASTERN SECTION

The Fall Meeting of the Eastern Section of the Ontario Society of Radiographers was held in the Jeanne Mance Residence of the Hotel Dieu Hospital, Kingston, on November 21st, 1953, presided over by the new Chairman, Sister E. MacPherson, R.N., R.T., with about 50 members and guests from a wide area, present.

The Reverend Mother Borden welcomed the members and extended a very cordial invitation for them to visit the hospital, especially the X-Ray Department at the close of the meeting. Many members took advantage of this kind offer.

Mr. H. A. Clarke, R.T., of the Royal Ottawa Sanatorium, was unanimously elected as liaison officer.

It was suggested that the Spring Meeting should again be held in Kingston. Sister MacPherson welcomed this idea.

Expressing the hope that more student and graduate technicians would contribute technical papers, etc., Sister commented on the fact that a prize-winning entry amongst the film exhibits on the routine examination of extremities, forwarded by a small hospital, was presented at the International Convention.

This brought to a close the business part of the meeting.

The first speaker in the Technical Session, Mr. Ray Travis, R.T., was introduced by Miss Tilbe. His subject was "The Technician's Role in Encephalography." Mr. Travis's discussion was illustrated by excellent diagrams and films.

We were very pleased to welcome our next speaker, Dr. R. C. Burr, F.R.C.S., Radiologist at the Hotel Dieu Hospital, Kingston. Everyone found Dr. Burr's lecture on "Trends in Pelvimetry" most interesting and informative. He illustrated why it is always necessary to produce films of first class quality to be of maximum assistance to the obstetrician.

Mrs. Blanche Kennedy, R.N., R.T., introduced Dr. E. P. White, F.R.C.S., who was a pioneer in the use of "Abdominal Aortography." This was the subject on which he gave an excellent paper and demonstrated the comparative ease with which the examination could be carried out whilst at the same time producing very valuable information.

Before going on to the film of "Radiation Therapy," presented by Miss Marguerite Bolster, R.N., R.T., everyone enjoyed a delightful lunch provided by the Sisters of the Hotel Dieu Hospital.

Following this film, Sister MacPherson thanked Mr. J. White for the lovely flowers from X-Ray and Radium Industries Limited, which decorated the tables.

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New Coolidge rotating anode tube assures longer life under the heaviest schedules

1. EXTRA HEAVY FILAMENT . . . . . Tungsten wire in HRT cathode is much larger than in conventional tubes, minimizing a common cause of failure.

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Remember, too, you get a more compact tube for greater maneuverability. Why not get the facts on the HRT (130 kvp — 500 ma) or its companion in the all-inclusive G-E tube line — the LRT (100 kvp — 500 ma). Ask your G-E x-ray representative, or write the nearest office of General Electric X-Ray Corporation, Limited — Montreal, Toronto, Vancouver, Winnipeg.

You can put your confidence in —

GENERAL ELECTRIC

Mr. H. A. Clarke, R.T., proposed a vote of thanks to all the speakers for their interesting papers and expressed a desire to meet them again at future meetings.

Miss Geldrant, R.N., R.T., closed the meeting with a vote of thanks to Reverend Mother Borden, Chairman and Secretary.

—EVELYN TILBE, R.T.,
Secretary-Treasurer.

NORTHERN SECTION

The third meeting was held at the Sudbury General Hospital on Dec. 5th, 1953, with 23 members present. Papers were presented by Dr. George Walker, Bronchography and Angiocardiography, accompanied by slides, and Mr. Walter Brown of General Electric X-Ray on "When and When Not to Call a Serviceman." Mr. Len Stewart contributed the Sunnybrook movies on "The Cervical and the Lumbar Spine." A further movie, "The Inside Story," was presented through the courtesy of Mr. James Seed, Canadian Kodak Company. Lunch followed, served by the Sisters of the Hospital.

LAKEHEAD SECTION

Regular monthly meetings still held on the second Wednesday of each month. The next scheduled meeting January 13th, 1954, at St. Joseph's Hospital, Port Arthur. Section Chairman, Mr. R. E. Gore, R.T.

Congratulations are in order to Ray Fujimoto who in a rash moment weakened and joined the ranks of ex-bachelors this summer. Ray has just let the cat out of the bag.

Ray Fujimoto, who, along with getting married, is our faithful *Focal Spot* Distributor, was presented with a Society ring, for his services, at the last meeting of the Executive Committee. Further congratulations to Ray and our best wishes.

Christmas greetings for the officers and members of the O.S.R. have been received from Mr. and Mrs. Li Shao-tang. Mr. Li is an associate member of the O.S.R. and works at St. Teresa's Hospital, Kowloon, Hong Kong. It is interesting to note also that this member, the farthest one from Ontario, is the first member to pay his 1954 membership fees!

LA SOCIETE DES TECHNICIANS EN R.X. DE LA PROVINCE DE QUEBEC

La 2ième assemblée générale a eu lieu le 28 novembre 1953 à 2 heures et 20 p.m. à la Résidence des Infirmières de l'Hôpital Général de la Misécicorde de Montréal.

Le Docteur Lionel Lafleur a fait une intéressante conférence sur la "Radiologie au service de l'Obstétrique." Un succulent goûter fut servi. Nous remercions sincèrement les Religieuses de l'Hôpital ainsi que le docteur Lafleur pour leur cordial acceuil.

Nos plus sincères condoléances à la Révérende soeur Delisle r.h. technicienne en radiologie, actuellement à l'Hôpital Hôtel-Dieu de Hauterive, Côte Nord, à l'occasion de la mort de son frère.

Aussi nos plus sincères condoléances à Mme. T. Bouchard, R.T., de la Clinique du Thorax de l'Hôtel-Dieu de Montréal, à l'occasion de la mort de son frère.

Nos plus sincères condoléances vont également au Dr. Adams, radiologiste à l'Hôpital Sainte-Anne de Bellevue, à l'occasion de la mort de son fils.

Tous nos voeux de prompt rétablissement à Mlle. Béatrice DesLauriers, I.L., T.E.

Tous nos voeux de prompt rétablissement à M. Albert Chiffins, R.T., Directeur de la C.S.R.T., qui a subit une intervention chirurgicale, et dont la convalescence est des plus heureuse.

Nous souhaitons un bon voyage "en avion," pour la Floride, au Docteur G. Gill, radiologiste à l'Institut du Radium.

Toutes nos félicitations au Docteur L. A. Gagnier, radiologiste à l'Hôpital Saint-Jean de Dieu, qui vient d'être àlu Président de la Société canadienne-française d'électro-radiologie. Le Docteur Gagnier a déjà été Président Honoraire de notre Société des Techniciens en Radiologie de la Province de Québec.

—ALICE PAQUIN, I.L., T.E.,
Rédactrice adjointe.

SASKATCHEWAN DIVISION C.S.R.T.

SASKATOON BRANCH

The first monthly meeting of the Saskatoon Branch was held in the nurses' residence of St. Paul's Hospital the evening of November the 12th at 8 o'clock. Attendance for the meeting was good.

The first official business of the evening was the election of officers for the coming season. Mr. Wilfred Hildebrand was elected as chairman with Miss May Alldred taking over the duties of secretary. The new programme committee was then elected with the task going to Miss E. King, Mr. Wm. Attridge, and Mr. George Derrick. A general discussion then followed to determine the day of the week the future meetings would be held on. It was approved that Wednesday was still the most satisfactory day, which brought the business section of the meeting to a close.

Mr. Ken MacKenzie of the General Electric Company X-Ray Division then presented a film on x-ray work which was enjoyed by all present. Mr. MacKenzie told the meeting that a prize would be put up for the most unusual radiograph taken by any of our members. By "unusual" Mr. MacKenzie means such subjects as plants, flowers, etc., or any form of trick radiography. This sort of thing is the type of idea that will add more interest to the members and probably give it a bit more life. Here's hoping Mr. MacKenzie has a pile of entries.

The meeting was adjourned following the serving of a delicious lunch by courtesy of the Sisters of St. Paul's Hospital.

The December meeting was finally cancelled due to the inability of obtaining a guest speaker for the evening. The first meeting of the New Year will take place in January and we hope to see all of the branch members out for it.

Congratulations to all the successful candidates in the November C.S.R.T. examinations. Mr. A. D. Mayo, Mr. J. Leatherdale, Mr. Karapita, Miss Martin, Miss Tkach and Sr. St. Thomas.

In closing, I would like to wish all our members a Very Merry Christmas and a Very Happy New Year on behalf of the technicians of the Saskatchewan Division of the C.S.R.T.

—C. B. JOHNSON, R.T.,
Sub-Editor.

QUEBEC SOCIETY OF X-RAY TECHNICIANS

A regular meeting of the Quebec Society was held on November 28th, 1953, at the Misericorde Hospital in Montreal. We were cordially welcomed by Sr. Bernice who also introduced our speaker of the afternoon, Dr. Lionel Lafleur, radiologist of that hospital.

Dr. Lafleur gave a very interesting lecture on "Radiology in the Service of Obstetrics" and showed excellent films by way of illustration. Miss Claire Belanger thanked the speaker. Following a short business session, we were entertained at a delicious tea.

We are pleased to report that Mr. Albert Cheffins, who has been a patient in the Queen Mary Veterans' Hospital, is back at home and hopes to be at work by the New Year.

—EDWINA BOA, R.T.,
Sub-Editor.

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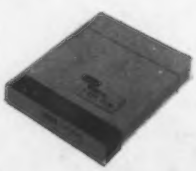

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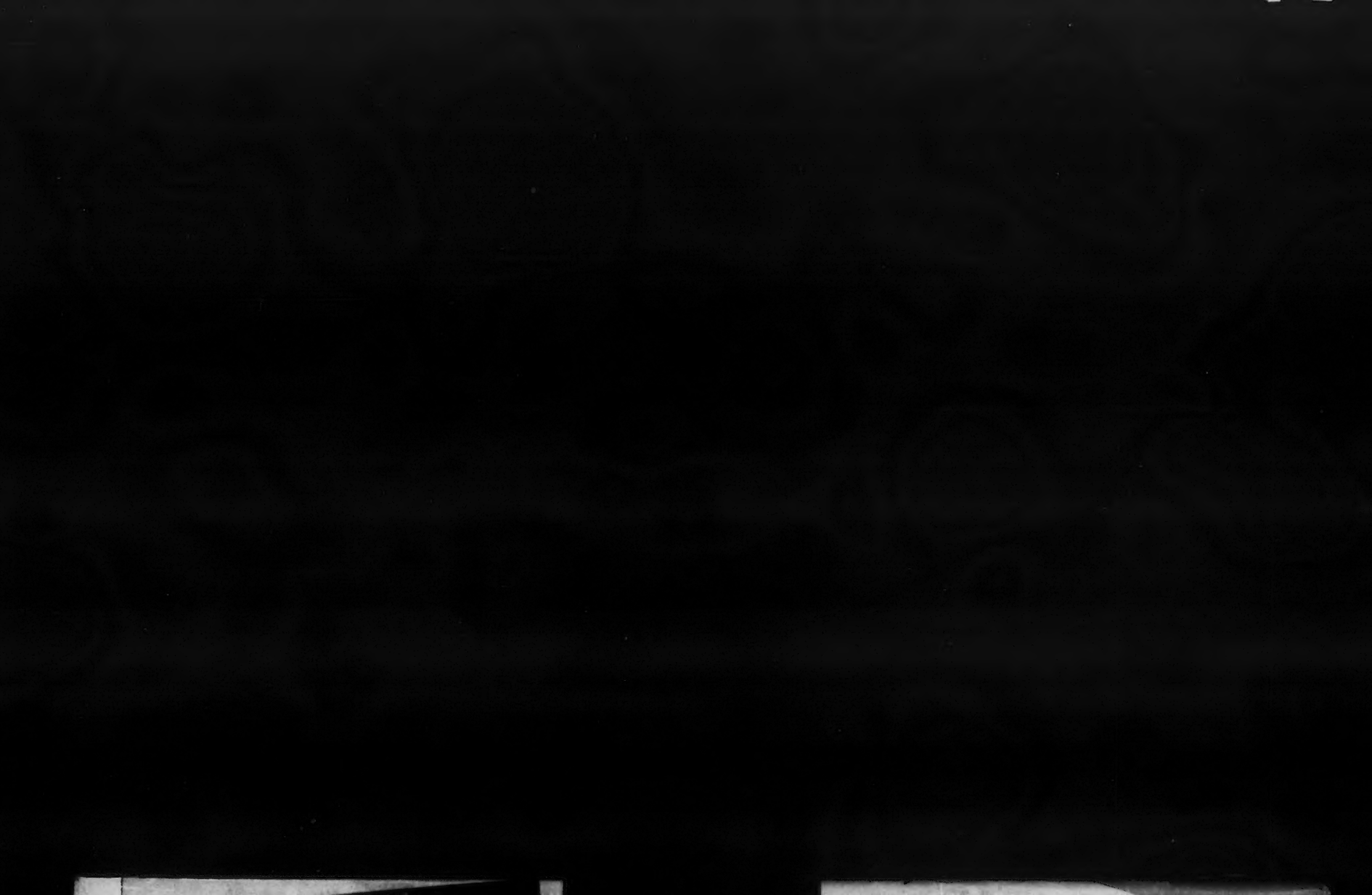
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